

**AN INVESTIGATION INTO THE CONTRIBUTION OF MOBILE-
ASSISTED LANGUAGE LEARNING TO THE ACQUISITION OF
ENGLISH AS A SECOND LANGUAGE IN RWANDA**

by

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Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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December 2015

Abstract

In developing and developed countries, a foreign language can be used as a second language, and be attributed various functions and statuses such as being an official language, and being used as a language of instruction at some, or all, levels of education. In Rwanda, one of East Africa's developing countries, for example, English has gained the status of official language and is used as a language of instruction at all levels of formal education. In this context, the successful acquisition of English can contribute to Rwandans' advancement both academically and professionally.

Different theories and hypotheses have been introduced to explain how a second language can be successfully acquired or learnt. Some of them, such as the input hypothesis, constructivism and connectionism, state that second language acquisition or learning occurs when a learner is exposed to rich, regular and comprehensible input. According to these theories, the main problem that most second language learners face is the lack of a relevant input. Despite being a young field of research, mobile-assisted language learning has the potential to overcome this problem and, therefore, to contribute to the performance of second language learners and users, either in their studies or in other activities in which they are required to use the second language.

With the integration of mobile-assisted language learning and second language acquisition theories, this research focused on the acquisition of English as second language in the context of a developing country. In addition to making a contribution to the available literature in the field, the objective of this research was to examine the extent to which using mobile technological devices can contribute to the successful acquisition of English at university level by exposing the students to rich and comprehensible input.

Opsomming

In ontwikkelende en ontwikkelde lande kan 'n vreemde taal wat as 'n tweede taal gebruik word verskeie funksies en statusse verkry, byvoorbeeld om as amptelike taal en as taal van onderrig op sommige, of alle, vlakke van onderwys te funksioneer. In Rwanda, een van die Oos-Afrikaanse ontwikkelende lande, het Engelse die status van amptelike taal en word dit as die taal van onderrig op alle vlakke van formele onderwys gebruik. In hierdie konteks, kan die suksesvolle verwerwing van Engels bydra tot Rwandese sevooruitgang, beide akademies en professioneel.

Verskillende teorieë en hipoteses is al voorgelê om te verduidelik hoe 'n tweede taal suksesvol verwerf kan word. Sommige, soos die toevoerhipotese, konstruktivisme en konnektivisme, stel dat tweedetaalverwerwing plaasvind wanneer 'n leerder blootgestel word aan ryk, gereelde en verstaanbare toevoer. Volgens hierdie teorieë is die grootste probleem waarvoor meeste tweedetaalleerders te staan kom die gebrek aan toepaslike toevoer. Ten spyte van die feit dat mobiele bygestaande taalaanleer 'n relatief jong navorsingsveld is, beskik dit oor die potensiaal om by te dra tot die sukses van tweedetaalleerders en -gebruikers, hetsy in hul studies of in ander aktiwiteite waarin daar van hulle verwag word om die tweede taal te gebruik.

Deur die integrasie van mobiele taalverwerwings- en tweedetaalverwerwings-teorieë, fokus hierdie navorsingstesis op die verwerwing van Engels as tweede taal in die konteks van 'n ontwikkelende land. Bykomend tot 'n bydrae wat hierdie navorsingstesis tot die beskikbare literatuur in die veld kan toevoeg, is die doel ook om die mate waarin die gebruik van mobiele tegnologiese apparatuur kan bydra tot die suksesvolle verwerwing van Engels op universiteitsvlak deur studente bloot te stel aan ryk en verstaanbaar toevoer te ondersoek.

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List of Abbreviations

ANOVA	Analysis of Variance
CALL	Computer Assisted Language Learning
CMC	Computer Mediated Communication
ESL	English as a Second Language
ICT	Information and Communication Technology
L1	First Language / Mother tongue
L2	Second Language
MALL	Mobile Assisted Language Learning
MINEDUC	Ministry of Education of Rwanda
NISR	National Institute of Statistics of Rwanda
OLPC	One Laptop Per Child
PDA	Personal Digital Assistant
P-VALUE	Probability Value
REB	Rwanda Education Board
SLA	Second Language Acquisition
SMS	Short Message Service
STD.DEV	Standard Deviation
TeLL	Technology for Language Learning
UR	University of Rwanda

Chapter 1: INTRODUCTION

In the first chapter of this study, the background to the research problem is discussed, and the research problem is explained. The research objectives and hypothesis are stated, and the research question posed. The scope and limitations are explained, and a brief chapter overview of the remainder of the study is presented.

1.1. Background to the Research Problem

In their investigation of the way in which language is used in the world of mobile technology, Barton and Lee (2013:65) state the following:

We are living in an increasingly mobile world, both physically and virtually. Flows of people, knowledge, ideas and objects are all speeding up, leading to new interactions between people and new forms of learning online and offline. Language becomes an important vehicle that can support, direct, impede and channel these flows.

The use of computers, tablets, mobile phones and other electronic devices has become a necessity in every human activity, including academic and professional. But due to economic issues, not everyone can afford all these devices. Most of the time, computers are more expensive and more difficult to maintain than mobile phones and other mobile devices, and this may be the main reason why people have more access to mobile phones than to computers.

In language teaching and learning, the combinational use of all these electronic devices, i.e. computers and mobile devices, can play an important role in the acquisition of language, but due to economic limitations, most language learners use their mobile phones as the preferred language learning tool, and they benefit from them, especially when they receive sufficient guidance and assistance from their teachers, instructors or lecturers.

The use of mobile phones and other mobile electronic devices in language learning, which is referred to as Mobile Assisted Language Learning (MALL), discussed in the section 2.1.2 of this thesis, can contribute to the acquisition of English as a second language (ESL), as students can use these devices to improve their language without the presence of their language teachers. According to Krashen (1982:76), such tools are needed, and should be provided by the language teachers as they have the responsibility to help the students “beyond the language classroom”.

With the integration of MALL and three different but related second language acquisition (SLA) theories, namely Krashen’s Input Hypothesis, Constructivist Theory and Connectionist Theory, discussed in section 2.2, this thesis reports on an investigation to determine whether the use of electronic mobile devices can help university students in Rwanda to succeed in their studies, especially in the acquisition of English as a second language (ESL).

This research is one of the possible solutions to the criticism by Rast (2008:145) that the input hypothesis “simply posits ‘understanding’, which implies ‘comprehensible input’, without addressing the process by which a learner makes the input comprehensible”. This study is an attempt to show how university students can successfully learn the second language by being exposed to richer and more comprehensible input through the use of the mobile technological devices.

1.2. Problem Statement

Regarding the settings in which a second language (L2) can be learnt or acquired, Ellis (1994: 214 – 229) differentiates between natural and educational contexts. An L2 can be acquired by exposure, through informal interactions in a linguistic environment, or be learnt through formal education. The linguistic situation of Rwanda (see section 2.4.2), as an officially multilingual country (see subsection 2.4.2.1), does not favour both settings for the acquisition of ESL; it only favours the formal educational setting. English is only learnt at school, in the formal language classroom, the context which is defined by Ellis (1994:227) as “a

setting where the target language is taught as subject only and is not commonly used as a medium of communication outside the classroom". In Rwanda, English language is almost not used outside the classroom setting.

The constitution of Rwanda recognizes Kinyarwanda as the national and the first official language, then French and English as respectively the second and the third official languages. In Rwanda, more than 99% of the Rwandan population speak Kinyarwanda; and 90% speak Kinyarwanda only, while less than 5% can speak French and/or English (see subsections 2.4.2.1 and 2.4.2.2). Kinyarwanda is used in everyday life activities and situations. English, in addition to being an official language, has been used as the language of instruction at all levels of education in Rwanda since 2008. In the Rwandan context, contributing to the acquisition of ESL equals contributing to Rwandan student success. One cannot overstate the importance of mastery of the English language for the Rwandan students' academic success.

Different theories and hypotheses have been introduced to explain how an L2 can be successfully acquired or learnt. Some of them, such as the input hypothesis (see 2.2.1), constructivism (see 2.2.2) and connectionism (see 2.2.3), state that an L2 is acquired when a student is exposed to rich, regular and comprehensible input. According to these theories, the main problem that learners, including Rwandan university students, face within the SLA process is the lack of a relevant input.

As far as the acquisition of ESL in Rwanda is concerned, the integration of modern technologies with SLA theories can potentially be one of the ways to overcome the problem of lack of input. With reference to the economic background of Rwanda (see 2.4.1), mobile assisted language learning (MALL) seems to be the relevant option. In the same framework, this research emphasized the contribution of mobile devices to the acquisition of ESL in Rwanda, by making the classroom-received input more comprehensible for students, by regularly exposing students to a richer input, and by equipping them with enough tools to process any ESL input.

1.3. Research Objectives

In order to answer the research question (see below), and to verify the research hypothesis, this research had the following specific objectives:

- To assess the current situation of comprehension skills of students doing ESL at the University of Rwanda (UR).
- To introduce the use of mobile devices for ESL input processing purposes, i.e. input boosting and understanding at UR.
- To assess the academic performance of students who use their mobile devices for ESL learning purposes at UR versus students who do not use mobile learning technologies.
- To determine the extent to which mobile devices can contribute to ESL acquisition in Rwanda.

1.4. Research Question and Hypothesis

1.4.1. Research Question

English is learnt in Rwanda as a second or third language. The linguistic background of Rwanda (see 2.4.2) does not favour the acquisition of English in an informal setting because Kinyarwanda is the national language, the dominant language that is spoken and used by the whole population in all activities. While English is one of the three official languages, is learnt at school and used as a language of instruction at all levels of education, this cannot be considered to be enough for its successful acquisition. Language students in particular, and all students in general, do not have enough opportunities to practice English outside the classroom, and this influences their performance in both English and other courses.

According to Bradburn, Sudman and Wansink (2004:20), “the research question defines the purposes of the study”. In this context, by helping students at UR with English language input processing, this research attempted to answer the following question:

How can mobile assisted language learning (MALL) contribute to the successful acquisition of English as a second language (ESL) at university level in Rwanda?

1.4.2. Research Hypothesis

According to Somekh and Lewin (2005:346), “hypothesis is the term used for a proposition that will be tested in subsequent research”. In this framework, the following hypothesis was set and tested by this research:

MALL can help the university students in Rwanda to successfully acquire ESL by exposing them to rich and comprehensible input.

1.5. Scope and Limitations

With the focus on UR, this study was about how the use of mobile devices can contribute to the successful acquisition and learning of English at the university level in Rwanda. English is used as a second language in Rwanda, it is taught at school, and it is the language of instruction at all levels of education. Due to the linguistic background of Rwanda (see 2.4.2), it is not easy for the students to improve and understand the input received in their language classes.

Without ignoring other related theories, this study is mostly limited to Krashen’s input hypothesis of second language acquisition (see 2.2.1). As far as technology for language learning is concerned, this study is limited to the use of mobile devices such as laptops, mobile phones and tablets, and how they can be used to expose students to comprehensible and rich English language input.

The last point to be mentioned combines the limitations related to both time and budget. Due to limitations in both time and budget, a small case sample was studied during a relatively short period of time. The recommendation for future studies that may focus on larger groups of participants during a longer period of time is provided in section 6.2 of this thesis.

1.6. Brief Chapter Overview

This thesis is structured into six chapters illustrated in the following figure:

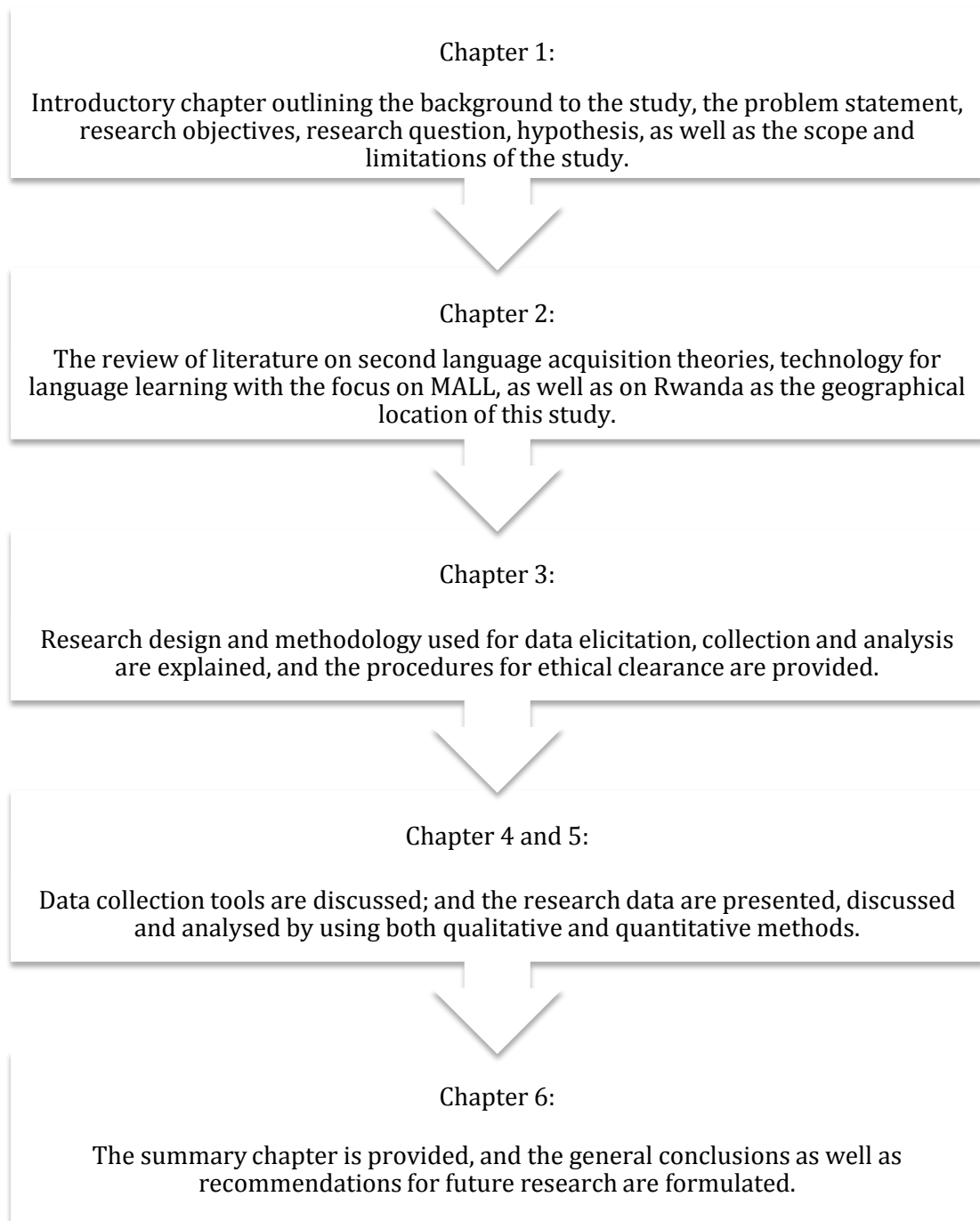


Figure 1.1: Chapter overview

Chapter 2: LITERATURE REVIEW

This study aims at making a contribution to the available literature in the field of technology for language learning (TeLL) in general, and mobile assisted language learning (MALL) in particular. It also hopes to make a contribution to the literature on second language studies, with the focus on the acquisition of English as a second language (ESL).

In order to locate this research in the field, and to verify the research hypothesis, academic works on second language acquisition (SLA) theories, particularly the Input Hypothesis, Connectionist Theory and Constructivist Theory, and on TeLL, particularly on MALL, were reviewed. In the domain of MALL, the literature on the use of mobile devices for language teaching and learning purposes was considered, with the focus on the acquisition of ESL. As far as SLA theories are concerned, the research emphasis was on the application of Input Hypothesis in combination with modern technologies used in language teaching and learning. At the end of this chapter, the reviewed literature about Rwanda will be presented, and in section 2.4 and section 2.5, the Rwandan linguistic background, the integration of SLA theories (section 2.6) and TeLL in the Rwandan context will be done.

2.1. Technology for Language Learning

Burston (2013:157) summarizes the history of technology for language learning (TeLL) as follows:

In a very broad sense, for as long as formal instruction has existed, there has been an interest in freeing learning from the constraints of time and place. Clay tablets, scrolls, then much later printed books were the first technologies employed to meet this challenge. In the latter part of the 20th century desktop computers, laptops, netbooks, and web-based applications greatly facilitated flexible access to language learning materials. The advent of hand-held computer-

based devices gave rise to mobile assisted language learning (MALL) as we know it today. Since the mid-1990s, MALL has focused on the exploitation of five mobile technologies: pocket electronic dictionaries, personal digital assistants (PDAs), mobile phones, MP3 players, and most recently ultra-portable tablet PCs.

According to Sarica and Cavus (2009:439), current language students “learn faster and easier than before because of the use of technology in educational institutions”.

Technology for language learning (TeLL) can be defined, according to Gitsaki (2013:106), as “a specialized field in applied linguistics concerned with the use of technology in language teaching and learning”. Gitsaki (2013:106) adds that it is a broad field which involves both the technologies, including hardware and software available for language teaching and learning, as well as the principles and theories underlying those technologies’ design, research and practice.

The application of technology in language learning started from the use of audio-lingual materials and software, and with the very fast development of the world, especially in the area of information and communication technologies (ICT), with the introduction and increase of access to Internet and mobile multimedia devices, it took various forms, and expanded from being used and accessed from the fixed language laboratories to becoming the portable and mobile tool that is useful and relevant for language learning (see subsections 2.1.2.4 and 2.1.2.6).

Nowadays, TeLL involves not the use of limited teaching software and audio materials in language classroom, but almost unlimited use of various web resources, social networking applications such as Facebook and Twitter, blogs, wikis, online corpora, audio and video communication applications. And these technologies are no longer dependent on heavy desktop computers and other hardware systems which can be accessed only inside the classroom, as mobile technologies, including smartphones, laptops, tablets and multimedia players, can be used for language learning and teaching purposes.

Depending on the type of electronic devices used for language learning purposes, TeLL can be classified into the following two categories:

- Computer Assisted Language Learning (CALL) that involves the use of computers (discussed in section 2.1.1), and
- Mobile Assisted Language Learning (MALL) that involves the use of mobile devices (discussed in section 2.1.2).

2.1.1. CALL

People may think that CALL started with the use of Internet in 1990s. But according to Heift and Chapelle (2012:555), language teachers and researchers introduced the use of computers for language learning and teaching purposes was already introduced in the 1960s, in the form of a “drill-and-practice-oriented software framed around behaviourism and the audio-lingual approach to language teaching” (Gitsaki 2013:106). CALL developed from the traditional language laboratories to the use of various modern facilities such as video conferences, blogs, social networks, word processing and multimedia applications, all for language learning and teaching purposes.

2.1.1.1. Definition

Computer assisted language learning (CALL) can be defined as two different but related concepts. On one hand, according to Levy (1997) cited in Yang (2013:19), it can be defined as “the search for and study of applications of the computer in language teaching and learning”; and on the other hand, according to Egbert (2005) quoted in Yang (2013:19), it can be defined as the “learners learning language in any context with, through, and around computer technologies”.

According to Gitsaki (2013:106), “computers have been utilized in all areas of language teaching largely due to their technological affordances and their ability to motivate and engage learners”. By individual and interactional use of different computer applications, learners can develop their cultural understanding abilities as well as their skills such as speaking, listening, reading and writing in a target language. By using computers, learners can also acquire new vocabularies, and develop their grammatical knowledge of the target language.

2.1.1.2. CALL Technologies

According to Levy and Stockwell (2006:2), “technologies used in CALL extend well beyond communication tools... They also include [computer] generic tools and devices such as the word processor for writing, online dictionaries for vocabulary work, or MP3 players for intensive listening practice”.

There are many ways in which computers can be used for language learning purposes, either by the use of language specialized applications, or by the use of general applications. For example, teachers and learners use computers in writing by using different word processing applications, they develop their speaking and listening skills by interacting through video and audio conference applications, and they develop their reading skills by reading various online and offline academic journals.

In addition to playing a significant role in language teaching and learning process, according to Heift and Chapelle (2012:559), computers “constitute a powerful means for computer-aided data elicitation and collection for researchers”. Computers can also contribute to language learning by facilitating interaction between learners and lecturers. In this regard, computer mediated communication (CMC) is the common means. According to Levy and Stockwell (2006:84), “CMC is a communication which takes place between human beings via the instrumentality of computers”. Inglis, Ling and Joosten (2000:9) add that CMC “is the collective term now generally used to describe all forms of two-way interaction via computers” that includes the use of “e-mail, asynchronous computer conferencing, synchronous computer conferencing, and video conferencing”.

As far as synchronous and asynchronous CMC are concerned, Levy and Stockwell (2006:107), mentioning Skehan (1998), state the following:

Synchronous CMC places a higher cognitive load on the learner, and as such is better suited to higher-proficiency learners. Asynchronous CMC gives learners more time to process and produce input, and may be thought to be suitable for lower-proficiency audiences as well as higher. Synchronous CMC normally lends itself to greater output on

the part of the learners, but this is often at the expense of accuracy. Asynchronous CMC provides learners with an opportunity to produce planned, edited language output and receive substantial generally well-formed input, but the fact that there are often time lags between sending and receiving messages may reduce learner motivation.

Through CMC, users interact by using either the synchronous applications such as Skype, Hangout, Facebook Messenger, and FaceTime, or the asynchronous applications such as Outlook, e-mails, Facebook and Yahoo groups, and blogs. In language learning and teaching, the learners can easily interact, and improve their communication and language skills through these interactions.

2.1.1.3. CALL and SLA Theories

According to Jordan (2004), mentioned in Levy and Stockwell (2006:110), second language (L2) teachers and researchers, as well as the designers of technology for language learning (TeLL) “wish to build on previous knowledge by rigorously testing current theories with a view to refining and improving them”. It is in this regard that various studies have been done on the integration of modern technologies for language learning purposes with the theories of language learning and teaching.

Concerning these studies, Levy and Stockwell give the example of Aitsiselmi (1999) who integrated the monitor model of second language acquisition (SLA) with the use of e-mail. According to Levy and Stockwell (2006:114), Aitsiselmi (1999) found that:

E-mail exchanges meet the requirements of the model by encouraging participation and helping students overcome shyness with the teacher in class, offering genuine interpersonal communication, providing access to authentic language input, providing comprehensible input containing structures a little beyond the students' current level of competence, occasionally allowing the teacher to draw students' attention to recurrent grammatical errors,

[and] ensuring the major focus remains upon meaning rather than form.

In order to make a positive contribution to the successful learning of a second language, computer assisted language learning (CALL) has to be evaluated especially by language teachers, and many studies have to be conducted by different researchers and scholars. According to Levy and Stockwell (2006:40):

Language teachers [and researchers] want to be able to assess student attitudes and perceptions in a learning environment that involves technology; they want to know whether CALL tasks are working as they should; and they are interested in the viability and effectiveness of specific methodologies and strategies, often with a view to refinement and improvement in practice.

It is in this framework that this study was also designed, with the assumption that by integrating the input hypothesis (see 2.2.1) and mobile assisted language learning (see 2.1.2), this study may contribute to the available literature about the integration of TeLL and SLA theories.

2.1.1.4. Problems with CALL

Without ignoring the importance and contribution of computers in the language learning and teaching process, this research focused on the use of mobile devices for language learning and teaching purposes. In this section, two of the problems associated with the use of computers, which can be resolved by using mobile devices, are discussed.

According to Battro (2013: 134), “we are entering a new digital era, with many more intellectual and technical tools than those provided by the teaching and learning restricted to a classroom or computer lab”. The first problem with computer-assisted language learning (CALL) is that it is based on the use of a desktop computer, which is more complicated and difficult to set up and maintain than mobile devices, its use is dependent on electricity, and it is usually accessible only from a specific location. In this framework, Levy and Stockwell (2006:108-109) give the following caveat:

If learners are expected to take part in CMC-based tasks outside of the classroom, then it is important to confirm that they have access to the necessary hardware and software, as well as enough technical ability to set up and operate the tools they are required to use.

The second problem with CALL is linked to the learners' negligence, and to the struggle to find the easiest, but not always the most adequate, way of achieving different goals. This problem occurs as a result of the time required to adequately use a computer, and this time is always more than the time required to use a mobile device because of the simplicity of using the latter.

2.1.1.5. MALL as One of the Possible Solutions to CALL Problems

The use of mobile devices in language learning and teaching can be one of the solutions to the problems associated with the use of computers, especially in a developing country where language learners have limited access to computers due to the lack of infrastructure, electricity, and internet network coverage.

According to Roschelle (2003), mentioned in Levy and Stockwell (2006:215), "the rationale given for the use of mobile technologies is that they enable a transition from the occasional, supplemental use associated with computer labs, to frequent and integral use".

This research was about technology for language learning (TeLL) in the context of Rwanda (see 2.4), where the majority of the population cannot afford a computer, and where there is not enough infrastructure to use even the computers that are available. This study hypothesized that mobile assisted language learning (MALL) can be one of the more relevant solutions to the problem mentioned above, and a potential contribution to the successful acquisition of English.

Mobile devices are personal, portable, and accessible from everywhere (see subsections 2.1.2.4 and 2.1.2.6). Mobile devices are generally cheaper than computers, and they are attractive to users, easy to use, and do not require external infrastructures. The following section 2.1.2 and its subsections discuss mobile assisted language learning (MALL) as the type of TeLL that can contribute

to the successful process of second language teaching and learning in the context of a developing country.

2.1.2. MALL, the Focus of the Research

Before defining Mobile Assisted Language Learning (MALL), increase in the use of mobile technology tools by students, as stated by Jacobson and Turner (2010:131), should be considered:

The explosive growth of the mobile phone and other mobile communication technologies worldwide, particularly among young people, is well documented. College students increasingly rely on cell phones instead of e-mail to communicate with their friends and family. Given these trends, it is no surprise that educators are seeking to harness the cell phone and other mobile technologies for use in the classroom.

Concerning this increase in the use of mobile technological devices, Pollara (2011), mentioned in Dang (2013:474), argues that it positively affects our life:

It cannot be denied that these mobile technologies made up of mobile phones, tablet computers, and other means of wireless communication change how we live, work, and socialize by allowing us to carry out a variety of daily tasks such as checking email, listening to music, playing games, chatting to friends via social networking, and so on.

This research did not consider the impact of mobile devices on all these activities; it only considered the use of mobile devices for English language learning purposes. This research focused on MALL as, according to Valk, Rashid and Elder (2010), cited in Chen (2013:20), it can serve to “improve access to education and promotes learning that is learner-centered, personalized, collaborative, situated, and ubiquitous”. This research studied the case of Rwanda (see 2.4.1), where English is used as second language in a multilingual context (see 2.4.2).

Burston (2013:157) states that “though a young field, some 575 works relating to MALL have been published over the past two decades”. However, no research on MALL or other domains of TeLL has been done in Rwanda. This can implicate the following problems that need to be resolved by researchers and scholars:

- Firstly, it can implicate that there may be a problem of lack of enough literature about MALL, especially in developing African countries, and that there is a need to conduct enough studies aiming at solving that problem.
- The second implication is the gap between the available research findings in the field of MALL and the countries concerned. In other words, the available literature covers only some countries and cannot be generalized to others.

In attempting to fill this gap, this research was designed in the framework of Dang (2013:475), according to whom new studies on the use of mobile devices “for educational and English language learning purposes” are required to fill this gap, and to contribute to the available literature.

2.1.2.1. Definition

According to Richards and Schmidt (2010) mentioned in Dang (2013:476), “mobile [assisted] language learning is defined as the use of mobile devices including mobile phones and other means of wireless communication for language learning”. Mobile assisted language learning (MALL) is a branch of technology-enhanced learning which involves the use of mobile devices, such as smartphones, pocket audio or video recorders and players, portable radios and compact disk players, multimedia players, personal digital assistants (PDAs), tablets and laptops, in language learning and teaching.

Gamper (2004), quoted in Baleghizadeh and Oladrostam (2010:2), defines MALL as the category of technology for language learning (TeLL) which involves the use of “any device that is small, autonomous and unobtrusive enough to accompany us at every moment” for language learning and teaching purposes. In other words, MALL is the category of technology enhanced language learning

that takes place with the mobility and the portability of learning devices, as well as the mobility of their users.

According to Baleghizadeh and Oladrostam (2010:3 – 4), like “other forms of technology, MALL is a branch of technology-enhanced learning which can be implemented in numerous forms including face-to-face, distant or on-line modes”. MALL involves the mobility of persons, the portability and mobility of devices, as well as the flexibility of time and places. Kress (2010:29) mentions that both mobility and portability “come together in promising to match the attractions of the market through unbounded access and individual choice as expressed in concepts such as the personalised curriculum”. This research investigated the acquisition of English in a formal setting.

2.1.2.2. MALL as an Academic Field

According to Jacobson and Turner (2010:131), mobile assisted language learning (MALL) is an academic field in which many researchers and scholars are actively involved because of “the explosive growth of the mobile phone and other mobile communication technologies worldwide”, and the increase of their reliability in communication and other life activities.

However accessible and simple mobile devices are, Baleghizadeh and Oladrostam (2010:4) argue that “different scholars in the field have underscored that MALL should be implemented in the classroom, taking the presence of learners as a paramount factor into consideration”. This is because language learners need assistance and guidance from their teachers and lecturers, in order to benefit from mobile devices. As far as this study is concerned, the participants were guided and facilitated by the researcher on the applications and resources used for English language learning purposes (see section 3.4).

Sharples, Taylor and Vavoula (2007:224) argue that the use of new mobile devices in education is relevant to the current educational methods, and summarize this relationship in the following table:

<i>New learning</i>	<i>New technology</i>
Personalized	Personal
Learner-centered	User-centered
Situated	Mobile
Collaborative	Networked
Ubiquitous	Ubiquitous
Lifelong	Durable

Table 2.1: New learning and new technology compared (Sharples, Taylor and Vavoula 2007:224)

Recently, many MALL-related academic projects have been designed and implemented all over the world by different researchers and scholars. According to Dang (2013:475), many researchers and scholars have justified “the merits of... mobile devices as effective tools in various [second language learning]... contexts”. For example, Kondo, Ishikawa, Smith, Sakamoto, Shimomura and Wada (2012) found that using social networks, online and offline resources, and different language applications on mobile devices positively influence the second and foreign language learners’ attitudes and skills for self-regulated language learning. And Baleghizadeh and Oladrostam (2010) found that the use of multimedia facilities provided by mobile electronic devices contribute to the acquisition of new vocabularies in second and foreign languages.

Depending on the mobile technology devices concerned, Jacobson and Turner (2010:132) classify mobile learning projects into three categories:

First, several... projects have focused on using mobile devices as course content delivery systems, offering functionality that is similar to that of computer. Second, other projects have developed more specialized applications for cell phones and [personal digital assistants] (PDAs), customizing them for use on specific educational task. Third, still other projects incorporate mobile devices into an array of educational tools, using them mostly for communication.

This study focused on mobile devices as the potential tools that can contribute to the understanding of the linguistic input in English as a second language, and which can expose students who take English as one of their major subjects in Rwanda to rich and comprehensible input.

2.1.2.3. MALL in a Classroom Setting

Mobile assisted language learning intersects with other fields. It can be studied as either one or a combination of different areas of knowledge such as linguistics, education, technology, and communication. As it is discussed in the following subsections, when it is well implemented in a classroom setting, with the active involvement of both the teachers and students, it can contribute to a successful teaching-learning process.

In this framework, Weiss (2010:90) says that “just offering these technologies does not lead to effective learning without the communication between the teacher and student”. In order to have good results from the introduction of MALL in formal education, Baleghizadeh and Oladrostam (2010:4) suggest that “using any kind of technological device should be accompanied by developing an efficacious type of methodology because these devices are not instructors but rather instructional tools”.

Because of their mobility (see section 2.1.2.6) and portability (see section 2.1.2.4) features, introducing mobile devices in a language classroom setting, as mentioned by Baleghizadeh and Oladrostam (2010:5), can assist language lecturers to make students “analysts of their own developing linguistic system and foster their autonomy”; in other words, MALL can help students to build their own knowledge, and to set their own learning strategies.

In addition to the creation of own knowledge and learning strategy, because of their users’ privacy and freedom, mobile devices can contribute to the ESL acquisition by creating confidence in the second language (L2) performance, especially in listening and speaking skills. Because of privacy and freedom, an ESL learner, for example a native speaker of Kinyarwanda using a synchronous

application such as Skype on a tablet or a smartphone, may have more confidence to respond in English to his/her interlocutor.

Not only communicative skills in a second language (L2), but also the grammatical skills are learnt and developed through the use of mobile devices. In their study on the effect of MALL on grammatical accuracy of Iranian students doing English as a foreign language in Iran, Baleghizadeh and Oladrostam (2010:7) found that “students who had used their mobile phones to record their voices for the sake of subsequent checking of their linguistic output had improved their grammatical accuracy more effectively than the students who were not offered this opportunity”.

This research investigated the way the UR students can benefit from the use of mobile devices for ESL learning purposes. During the data elicitation and collection period, the way students use their mobile devices was guided and supervised by the researcher. Second language theories in general, and the input hypothesis in particular, guided this research in setting the ESL students’ learning targets.

2.1.2.4. Portability and SLA

Mobile phones and other mobile devices, such as portable and handheld modern technological tools, can be used anytime and anywhere for language learning purposes. Because of this feature of portability, according to Yang (2013:19), “recent mobile electronic devices that hold the capacity for language learning... have been blurring the learning boundaries between classroom and home, as well as boundaries between the concept of computer and mobile devices”.

In supporting this view that mobile devices are good for learning purposes because of their portability feature, Yamaguchi (2005), cited in Chinnery (2006:13), provides the following comparison:

A computer is better than a mobile phone for handling various types of information such as visual, sound, and textual information, but mobile phone is superior to a computer in portability. And some students don’t have their own computer.

The portability feature is unique for mobile devices. In contrast to traditional computer assisted learning, and to traditional classroom-based learning, as mentioned by Jacobson and Turner (2010:132), “the research on mobile learning overwhelmingly describe [MALL]... as providing flexible, ‘just in time’, ‘just for me’ and ‘any time anywhere’ learning”. The portability feature of mobile devices is always noticed and appreciated, especially when comparing and contrasting the qualities of mobile learning and traditional computer-based learning.

Traxler (2007), cited in Jacobson and Turner (2010:133), says that mobile learning is “personal, spontaneous, opportunistic, informal, pervasive, situated, private, context-aware, bite-sized, and ‘portable’ [while] computer-based learning [is]... structured, media-rich, broadband, interactive, intelligent, and usable”. Jacobson and Turner (2010:133) summarized the qualities of mobile and computer-based learning in the following table:

<i>Mobile Learning</i>	<i>Computer Learning</i>
Informal	Structured
Media-specific	Media-rich/Broadband
Context-aware	Intelligent
Portable	Tethered
Private	Public
Personalized/customized functions	Generalized functions
Spontaneous/Opportunistic	Fixed, predictable
Bite-sized	Encyclopaedic
Communication	Productivity

Table 2.2: Compared Traxler qualities of mobile and computer learning (Jacobson and Turner 2010:133)

As far as the importance of portability to education in general, and to students in particular, is concerned, Kress (2010:29) argues the following:

Portability technology offers the hope of dealing with the seemingly problematic physicality of the school, its confining time structures and its general lack of attractiveness to many students and to provide instead the physical, social and emotional mobility as freedom of the individual.

Regarding the role of mobile devices, Hsu (2013:198) states that “portable computational technology now makes mobile devices an appropriate and potential tool to bridge the gap between formal and informal learning experiences, particularly in second language learning”. Gromik (2012) conducted research on how recording a video, by using portable devices, can contribute to the learning of English as a foreign language in Japan, by improving the “learners’ oral confidence” (Gromik 2012:224). During his research period, all the participants had to produce a 30 second video of themselves speaking English on a weekly basis. According to Gromik (2012:226), this study found that “producing regular cell phone videos encourages students to contemplate best video production strategies as well as enhance students’ word output performance”. Gromik’s findings show the relevance of the task-based method as one of the language teaching and learning strategies (see subsection 2.1.2.5).

The portability of mobile devices as learning tools encompasses the portability of learning materials such as books, multimedia teaching aids, school timetable, academic calendar, as well as the teacher-student communication tools, a feature which is not present in traditional CALL and traditional classroom learning. Bahrani (2011:245) illustrates the possibility of this fact with the contribution of MALL by arguing the following:

A mobile learning device can be used for language learning even without current ability to connect to Internet. For example, a mobile device with 8 gigabytes of memory equipped with MP3 player, movie player, and sound recorder allows for over 800 textbooks in PDF with 200 minute educational videos in the mobile video format.

While discussing the “portability of mobile media” tools, Chinnery (2006:13) states that because of mobile devices, all the language learning tools “can be just as easily utilized outside of the classroom as they can in it; learners can study or

practice manageable chunks of information in any place on their own time, thereby taking advantage of their convenience". And Roschelle (2003) mentioned in Bahrani (2011:245) states that:

Considering the use of different technologies that can provide quick access to authentic language input in informal language learning setting, mobile learning devices such as mobile phones now have the emerging potential to achieve a large scale impact because of their portability, versatile features, and low cost.

2.1.2.5. *Task-Based Language Learning*

Ellis (2009:3) defines tasks as "activities that call primarily meaning-focused language use". And Van den Branden (2006), quoted in Müller-Hartmann and Schocker-von Ditfurth (2010:18), defines the task as "an activity in which a person engages in order to attain an objective, and which necessitates the use of language".

Ellis and Shintani (2014:135) state that "task-based language teaching aims to develop learners' communicative competences by engaging them in meaning-focused communication through the performance of tasks". Even though its primary purpose is to develop the L2 learners' communicative fluency, Ellis and Shintani (2014:135) mention that task-based language teaching "also aims to develop learners' linguistic competence... and their interactional competence".

Task-based language learning can be defined as the acquisition and learning of any language through the accomplishment of a certain task that is not necessarily a language-oriented task, but which requires language learners to use the target language in one way or another. While accomplishing a given task, according to Ellis (2009:3), the second language learners "will need to pay attention to both meaning and form" of the language. In other words, the learners, without necessarily being aware of it, while they are accomplishing the given task, practice either spoken or written language.

As one example of task-based language learning, Ellis (2009:3) mentions that "learners involved in making an airline reservation will need to find the linguistic

forms to explain where they want to fly to, what day and time they want to fly [and] what kind of ticket they want". Another example, discussed in subsection 2.1.2.4, is recording videos by using mobile phones. The task encouraged the learners to practice English language speaking while recording and editing their videos. In addition to video recording, language learners can improve their language skills through telephone interactions, the use of social networks such as Facebook, Twitter, WhatsApp and others, especially when they involve other people who are more proficient in the target language than the learners.

As another example, Wong (2013) studied the way a language learner can improve language skills by capturing photos and posting them onto a wiki using a personal mobile device. Wong (2013) investigated how the use of a smartphone to accomplish this task by Singapore learners could contribute to their acquisition of Chinese idioms. According to Wong (2013: 198), "with the smartphones, [the learners] took photos in daily lives and made sentences with the idioms / conjunctions, ... they then posted those artifacts onto a wiki space for peer review", which includes, according to Wong (2013:200), "commenting on, [as well as] correcting or improving their peers' sentences". Wong (2013: 208) states that this task contributed to the Singapore learners' acquisition of Chinese by helping them "in maximizing their learning by exploiting the affordances of mobile learning, [namely interactions], mobility and personalization". These features, and the way they contribute to second language acquisition (SLA), are discussed in the following subsection 2.1.2.6.

2.1.2.6. *Devices and Users' Mobility, Interactions and SLA*

Gromik (2012:229) states the following:

Learners are becoming more familiar with using their cell phones to create and share content meaningful to them. As cell phones become more accessible to younger consumers, it is likely that they will become more familiar with this tool and they will have greater creative control with either the photo, audio or video recording

feature. It is up to teachers to develop activities that combine project-based language learning with cell phone technology.

Gromik (2012:229) talks about the creation of “meaningful” multimedia materials, and the exchange of those multimedia materials and other content among the young language learners using their mobile devices. Gromik (2012) focuses on interactions, creativity, and learning. In this section, the emphasis is going to be the contribution of interactions and mobility to the acquisition of an L2.

Interactions between L2 learners, lecturer and environment are among the most important factors contributing to the process of successful SLA. In using traditional computer assisted language learning (CALL), and in language classroom-based learning, these interactions take place only at a specific place during a specific period of time. In this regard, Hsu (2013:209) argues that “MALL, unlike CALL, can offer the advantage of mobility, which enables seamless learning from inside to outside the classroom”.

In comparing MALL to CALL, Hsu (2013) introduces the “mobility” feature that is available only for mobile devices. Many people may associate mobility to only its common meaning in mobile telecommunication technology, where it is usually used to mean the ability for something, especially for the devices, to be easily carried by a person. In this section, the term ‘mobility’ is used not only to refer to the mobility of devices, but also to refer to the free and easy mobility or movement of the device users, i.e. the L2 learners. The term ‘mobile interaction’ includes mobility in space and time, and is used to refer to the interactions between L2 learners who are freely moving, but who keep on interacting with one another through mobile devices.

With the integration of mobile interactions and applied linguistics, particularly L2 studies, some terminology changes. For example, with regard to this section, the term ‘second language acquisition (SLA)’ can be defined, according to Sharples, Taylor and Vavoula (2007:225), as “the processes of coming to know [an L2] through conversations across multiple contexts among people and personal interactive technologies”. Mobile devices, especially the ones that are primarily used for communication purposes, such as mobile phones, and

applications such as social networks and instant messengers accessible from mobile devices, can contribute to SLA as they promote interaction between learners and native speakers of the L2.

According to Baleghizadeh and Oladrostam (2010:5), different researchers found that “using mobile devices help learners have a better engagement with learning and to have a better interaction”. Alemi, Sarab and Lari (2012:104) investigated the contribution of using the short message service (SMS) on a mobile phone to the acquisition of vocabulary in an L2 and found that “in the long term, vocabulary learning via SMS helped students to retain more vocabulary compared to those who used a dictionary for vocabulary learning”.

And according to Vonderwell (2003) quoted in Weiss (2010:90), “social interaction among learners plays an important part in the learning process and can have a significant impact on learning outcomes”. In addition to contributing to L2 learning through mobile interaction, MALL can contribute to SLA through the mobility of learners. In this regard, Baleghizadeh and Oladrostam (2010:5) state that various researchers found that “mobile devices also facilitate contextual learning and they resultantly allow the information to be captured in learner’s own location in a way as to be resonant with students’ needs”.

Sharples, Taylor and Vavoula (2007:224) state the following:

Just as learning can be seen as a situated and collaborative activity, occurring wherever people, individually or collectively, have problems to solve or knowledge to share, so mobile networked technology can enable people to gain and share information wherever they have a need rather than in a fixed location such as a classroom.

According to Sharples, Taylor and Vavoula (2007:224), because of the mobile interactions facilitated by the new mobile technologies, any kind of learning, including the acquisition of English as a second language (ESL), can successfully take place wherever there is a need.

2.1.2.7. What is Mobile Language Learning?

Even though mobile devices are the main tools which help to distinguish mobile learning from other types of learning, Hemmi, Narumi-Munro, Alexander, Parker and Yamauchi (2014:357) state that “the definition of mobile [language] learning has shifted from the mobility of the devices to the mobility of the learner”. And Yang (2013:20) states that this “mobility has... enabled learning independent of location and any time even out of classroom”.

O'Malley, Vavoula, Glew, Taylor, Sharples and Lefrere (2003), quoted in Hemmi et al. (2014:357), define mobile assisted language learning (MALL) as “any sort of [language] learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies”. And Kukulska-Hulme and Shield (2008) mentioned in Kondo, Ishikawa, Smith, Sakamoto, Shimomura and Wada (2012:171), define it as a “formal or informal learning mediated via handheld devices which are potentially available for use anytime, anywhere”.

As far as the mobile learning environment is concerned, Chinnery (2006:9) mentions that “as in other technology-enhanced language learning milieu, mobile learning environments might be face-to-face, distance, or online; further, they may be self-paced or calendar-based”. And concerning the importance of MALL, Kondo et al. (2012:170) argue that it encourages the students to learn the language “without teacher intervention, i.e., self-study, in terms of time spent on learning tasks, levels of satisfaction derived from the tasks, and self-measured achievement”, and that it enables students to set their own goals, and to create their own “learning tasks and their in-class applications”.

2.1.2.8. What is the Role of Mobile Devices?

Mobile devices play an important role in the acquisition of all the language skills. According to Bahrani (2011:245), “current use of mobile devices in language learning ranges from vocabulary or grammar learning to story reading and

pronunciation practices". But the role played by mobile devices in language learning can vary depending on the type of the device used.

For example, concerning mobile phones, Chinnery (2006: 10) says that the use of their different features "enable communicative language practice, access to authentic content, and task completion" to the language learner.

As far as tablet computers are concerned, the study of Lan, Sung and Chang (2007) mentioned in Yang (2013:22) found that "the application of tablet... to facilitate the collaboration between peers outweighed the potential weakness hindering students' collaboration process in a traditional setting". And in this context, Yang (2013:22) states that "the utilization of the mobile-device-supported peer-assisted learning could reduce... learners' anxiety and promote their motivation and confidence".

2.2. Theories of SLA

In this section, three theories of SLA are discussed. The related concepts, their claims and statements are provided, and in section 2.6, they are interpreted in the Rwandan linguistic context. The Input Hypothesis is discussed as one component of Krashen's Monitor Model and as an approach to the acquisition of an L2, while Constructivism and Connectionism are discussed as examples of emergentist approaches to language learning, which emphasize language usage. Both Connectionism, which is sometimes referred to as Connectivism, and Constructivism are discussed as usage-based accounts for language acquisition, the approaches that have been introduced in the current emerging electronic educational world.

According to Crystal (2008:167), emergentism is "an approach in psycholinguistics which posits an interaction between biological and environmental processes in language acquisition, and provides an alternative to earlier theories which focused exclusively on one set of factors". Emergentists view language acquisition as "the result of both innate constraints and environmental input, which dynamically interact to yield language" (Crystal 2008:167).

Focusing on emergentism, Ellis (2003:64) says that “emergentists believe that many of the rule-like regularities that we see in language emerge from the mutual interactions of the billions of associations that are acquired during language usage”. Gass, Behney and Plonsky (2013:272) explain the emergentist view of language acquisition by stating that “learning does not rely on an innate module [which is the biologically equipped ability in a child to acquire any language], but rather it takes place based on the extraction of regularities from the input”. Emergentists do not support the innateness hypothesis, alternatively referred to as ‘nativist hypothesis’, according to which, as mentioned in Crystal (2008:246), “the rapid and complex development of children’s grammatical competence can be explained only by the hypothesis that they are born with an innate knowledge of at least some of the universal structural principles of human language”.

The literature about emergentist approaches to language acquisition, particularly constructivism and connectionism, is reviewed in this thesis, as they recognize the role played by input within the language acquisition process. At the end of this section, implicit and explicit learning are defined because the emergentists, especially the connectionists, refer to them when explaining how language learning can occur.

2.2.1. Krashen’s Input Hypothesis

To understand what the Input Hypothesis of SLA involves, one has to start by defining the term ‘input’ which, according to Rast (2008:3), was introduced and used in the area of applied linguistics, specifically in SLA in 1967 by Corder (1967), even though its phenomena, as mentioned by Rast (2008:3), were already referred to in the 1950s by Skinner (1957) and Chomsky (1959).

Input is used to refer to, according to Crystal (2008:247), “the external linguistic data available to speakers in the course of acquiring a language”; and this may be described as “what the [second language] learner hears and attempts to process” (Hatch 1983:81). In addition to the written input, according to Long (1983) quoted in Fang (2010:11), language input includes “the linguistic forms

(morphemes, words, utterances), the streams of speech in the air directed at the non-native speaker” of a language.

2.2.1.1. Definition and Claim

After explicating the concept of ‘input’ as it is used in applied linguistics, the Input Hypothesis of SLA will be discussed. The first thing to bear in mind is that Input Hypothesis is one of five hypotheses which comprise Krashen’s Monitor Model of SLA, the model in which Krashen (1981:1) posits that “adults have two independent [but related] systems for developing ability in second languages, [namely] subconscious language acquisition and conscious language learning”. In addition to the Input Hypothesis, the other hypotheses which comprise Krashen’s model of SLA, as mentioned by Shehadeh (2013:437-438), Levy and Stockwell (2006:112), and Gass and Selinker (2008:241), and comprehensively explained by Krashen (1982:10-32), are the Acquisition-Learning Hypothesis, the Natural Order Hypothesis, the Monitor Hypothesis and the Affective Filter Hypothesis.

The main claim of the Input Hypothesis, according to Shehadeh (2013:437), and as mentioned by Krashen (1985), quoted in Gass and Selinker (2008:309), is that an L2 is learnt “by understanding messages, or by receiving comprehensible input” which is defined by Gass, Behney and Plonsky (2013:131) as “that bit of language that is heard / read and that is slightly ahead of a learner’s current state of grammatical knowledge”.

2.2.1.2. Comprehensible Input

‘Comprehensible input’ should not be conflated with ‘comprehensible output’ which, according to Swain (1985) quoted in Gass, Behney and Plonsky (2013:356-357), “refers to the need for a learner to be pushed toward the delivery of a message that is not only conveyed, but that is conveyed precisely, coherently, and appropriately”.

Krashen (1982:21) claims that “a necessary but not sufficient condition to move from stage i to stage $i+1$ is that the acquirer understands input that contains $i+1$, where ‘understand’ means that the acquirer is focused on the meaning and not the form of the message”. Rast (2008:18) confirms that the language “acquisitional process is based on [this Krashen] rule”. Krashen (1982:21) adds that by using our linguistic competence, and with reference to the context in which we are, as well as the knowledge and the extra-linguistic information we have about the world, “we understand language that contains structure that is ‘a little beyond’ where we are now”, and in this way, we successfully progress with language acquisition. The Input Hypothesis implies that, as mentioned by Gass, Behney and Plonsky (2013:131), “language containing [only] structures a learner already knows” and “language containing structures way ahead of a learner’s current knowledge” do not contribute to the learner’s progress in SLA.

2.2.1.3. *Input Hypothesis, SLA and TeLL*

This study is located in the area of technology for language learning (TeLL), and it investigates how mobile assisted language learning (MALL) can contribute to the acquisition of ESL at a tertiary level in Rwanda. In terms of theory, it is mainly conducted within the framework of the input hypothesis, as it is the only theory which attempts, according to Shehadeh (2013:437), “to answer the important question of how we acquire language”. Gass and Selinker (2008:309) also mention the importance of this hypothesis by highlighting that “in Krashen’s view, the Input Hypothesis is central to all of acquisition and also has implications for the classroom”.

This study attempted to integrate Krashen’s input hypothesis in a Rwandan second language (L2) classroom context at university level. This research was guided by the view of Krashen (1982:21) that “we acquire [a second language] by going for meaning first, and as a result, we acquire structure”. This research attempted to integrate the input theory of second language acquisition (SLA) with MALL, as mobile electronic devices can help language learners to understand the meaning of new utterances in L2, for example by using an online

or offline dictionary or translator available on those devices. In other words, mobile devices help the language learners to understand the input, and this facilitates the communication between the language learners and the speakers of the target language.

According to Krashen (1982:60), “we acquire spoken fluency not by practising talking but by understanding input, by listening and reading”. And according to Gass, Behney and Plonsky (2013:132), “if input is understood, and there is enough of it, the necessary grammar is automatically provided”. This research specifically focused on how MALL can contribute to ESL acquisition by helping Rwandan university students to understand new written and spoken English utterances. It considered the impact of using mobile electronic devices on the comprehension of input, the process that can contribute to the successful ESL acquisition by students at UR, College of Education, located at Kigali in Rwanda.

2.2.2. Constructivist Theory

Inglis, Ling and Joosten (2000:27) discuss the traditional and the modern models of formal learning as follow:

In the traditional model of the classroom, the teacher is the focus, standing in front of a group of students and presenting information. What the teacher does in this situation is sometimes described as communicate knowledge. However, this explanation betrays (sic) a misunderstanding of what may actually be going on. Knowledge cannot simply be transmitted from the teacher to student. A learner does not receive knowledge but rather constructs it. What a teacher transmits is information. When learners receive that information they construct knowledge from it.

2.2.2.1. Definition and Claim

According to Cobern (1993:109), “the definition of constructivism is carried in its name. Learning is the active process of constructing a conceptual framework”.

Coburn (1993:110) says that constructivism is a model of learning which “implies that a student is always an active agent in the process of meaningful learning”.

Dalgarno (2001), quoted in Levy and Stockwell (2006:122), explained the constructivist view of second language (L2) learning according to the following three principles:

[The first is that] each person forms their own representation of knowledge, [the second is that] people learn through active exploration, [the third and last is that] learning occurs within a social context, and interaction between learners and their peers is a necessary part of the learning process.

Regarding constructivist theory, Coburn (1993:110) adds that “learning does not occur by transmission but by interpretation”. In other words, constructivism claims that learning is not a process whereby a teacher transmits knowledge to learners, but the process by which the learners understand the information received from their teacher. Hsu (2013:200) states that “constructivists of second language acquisition propose that the proficiency of target language can be scaffolded through interactions among instructor, learners and environment”. Learning is the process by which a learner understands the input and builds knowledge through interactions.

As one of emergentist approaches to language learning, constructivism claims that “the complexity of language emerges from associative learning processes being exposed to a massive and complex environment” (Ellis 2003:84). In the constructivist view, as mentioned by Ellis (2003:63), language learning occurs when “simple learning mechanisms operating in and across human systems” are “exposed to language data in a communicatively rich human social environment navigated by an organism eager to exploit the functionality of language”.

2.2.2.2. Constructivism, SLA and TeLL

Concerning the importance of constructivism in technology for language learning (TeLL), Gitsaki (2013:107) says that it has supported “the use of collaborative

learning tools and the design of activities that emphasize the centrality of the learner in the learning process and involve learners in investigation, discovery and discussion”.

According to Ellis (2003:63), constructivism is divided into many theories that “share a functional developmental, usage-based perspective of language”. Some of those theories are connectionism (alternatively referred to as connectivism), functional linguistics, computational linguistics and applied linguistics influenced by complexity theory.

As far as the role of comprehensible input in SLA is concerned, Ellis (2003:63-64) says that constructivist theories state that:

Structural regularities of language emerge from learners’ lifetime analysis of distributional characteristics of the language input and, thus, that the knowledge of a speaker / hearer cannot be understood as an innate grammar, but rather as a statistical ensemble of language experiences that changes slightly every time a new utterance is processed.

From the constructivist perspective, this research investigated how the successful ESL acquisition by UR students takes place through the mobile-assisted comprehension of input received from the classroom setting. It did not attempt to analyse the UR students’ innate language capacities. It considered the acquisition of ESL as a process of receiving and processing the language input by using mobile technological devices with the purpose of understanding the language.

2.2.3. Connectionist Theory

Clarà and Barberà (2013:3) state that “connectivism [alternatively referred to as connectionism] began its emergence in 2005, when Siemens (2005) published... a paper in which he put connectivism forward as an alternative learning theory to behaviourism, cognitivism and constructivism”. And according to Dunaway (2011:683), “connectivism provides a new perspective of how learning takes place in digital learning spaces”.

2.2.3.1. Definition and Claim

Connectionism can be defined, according to Rast (2008:5), as an emergentist approach that “involves the use of computer processing to simulate the functions of the mind and to predict what humans will do under specific conditions”. And Dunaway (2011:676) defines connectionism as:

A theoretical framework for understanding learning [which]... posits that learning takes place when learners make connections between ideas located throughout their personal learning networks, which are composed of numerous information resources and technologies. Knowledge emerges from an individual’s learning network as she recognizes connections between concepts, opinions, and perspectives that are accessed via Internet technologies such as electronic databases, web search engines, and online information resources.

Dunaway (2011:675) states that “connectivism acknowledges the role of information technology in the processes of accessing information from multiple sources and the development of skills for evaluating connections between different information sources in a dynamic information network”. Dunaway (2011:675) says the following:

The idea that learning takes place across networked learning communities and information technologies is central to connectivism, [which is] a theory of learning that emphasizes the importance of networked information resources throughout the processes of learning.

Ellis (2003:85) talks about the connectionist implementations which are “computer models consisting of many artificial neurons that are connected in parallel”. Connectionist models are divided into two types namely localist symbolic and distributed subsymbolic models, and both these models focus on “the emergence of skilled human performance through learning” (Rast 2008:5-6). Considering the problems with connectivist theory, Clarà and Barberà

(2013:4) state that “it does not satisfactorily account for the learning paradox, ... [it ignores the] place for the nature of interaction in its theory, ... [and] it is unable to explain the development of concepts”. In other words, it emphasizes its claims on computer simulation of human learning process, but it does not explain how the simulated process can be implemented in the real life.

According to the connectionism, language learning occurs “by activating the input layer, which then produces activation throughout the entire network” (Rast 2008:6). According to this model, SLA becomes successful once the received input is processed, in other words when it is understood and reproduced, and when the L2 learner is able to compare the output with the input in order to make self-corrections.

According to Gass, Behney and Plonsky (2013:522), connectionism claims that “learning takes place based on the extraction of regularities from the input”. Ellis (2003:85) adds that “connectionists investigate the representations that can result when simple associative learning mechanisms are exposed to complex language evidence”. According to Gass, Behney and Plonsky (2013:273), “learning takes place as the network (i.e., the learner) is able to make associations and associations come through exposure to repeated patterns”.

2.2.3.2. Connectionism and SLA

This research investigated the acquisition of ESL in Rwanda where the only one national language, Kinyarwanda, is used in everyday life, and both French and English are only used as official languages. Whereas according to connectionism, exposure is central for language learning, Rwandan learners are almost not exposed to English input, except during the limited time spent in the ESL classroom. As one of the solutions to this problem, this research attempted to rectify this by exposing the students at UR to a rich English input through the use of various mobile device tools (see sections 3.4.1 and 3.4.2).

Within the SLA process, Gass, Behney and Plonsky (2013:272) say that according to the connectionist approach, “new associations are formed and new links are made between larger and larger units, until complexes of networks are formed”.

Connectionism has contributed to the field of SLA, especially to the area of task-based language learning (see subsection 2.1.2.5). Onnis (2013:118) says that:

Connectionist models have been applied to model specific language tasks such as perceiving speech and identifying spoken words, inferring the syntactic category of words and phrasal structure, learning regular and irregular forms of verbs, learning to read words, developing semantic knowledge, etc.

This research studied the case of ESL acquisition in Rwanda, where English is used as an official language since 1996, and as a language of instruction since 2008. It studied how mobile devices can be used to provide and understand the ESL rich and relevant input to UR students by involving them in some tasks such as using social networks, playing games, using different applications, and accessing various resources which stimulate their English language skills.

2.2.3.3. The Connectionist Views on Input

Connectionist models of second language (L2) input are dynamic and systematic. According to Onnis (2013:118), “connectionist models are not static representations of knowledge, but rather are capable of learning to form input – output mappings that eventually develop into systematic knowledge”.

In the context of L2 input, Rast (2008:235) discusses the main interest of connectionists as follows:

The connectionists want to know more about what learners do with the input they receive, they clearly need to distinguish between ‘input’ and ‘intake’ as well. They need to be particularly clear about what ‘input’ they feed into their networks, and they need to know what knowledge they can attribute to a learner.

Connectionists consider both 'input' and 'intake' in L2, which are two different terms. According to Gass, Behney and Plonsky (2013:340), Corder (1967) distinguished input, which "refers to what is available to the learner", from intake which "refers to what is actually internalized or taken in by the learner".

Connectionists support Krashen input hypothesis according to which there must be comprehensible input for successful language acquisition to occur. Gregg (2003:847) supports this argument by mentioning that "for any and every representation [of a new L2 utterance], a good deal of relevant input would be necessary".

To focus on the importance of using the concrete tasks for language learning purposes, in addition to the main claim of connectionism as discussed in subsection 2.2.3.1, DeKeyser (2003:329) states that "connectionists claim that the linguistic knowledge usually represented by rules can be represented equally well or better by low-level associations between concrete forms, and that this is how humans actually represent such knowledge".

In the connectionist view, it is better to learn the language by different tasks that require language practice than to learn it by applying the grammatical rules. In this context, this research assumed that the input, which the students receive in the language classrooms, is not enough to enable the students to successfully acquire English as a second language (ESL) at UR. This study focused on the explicit use of mobile devices as the important tools that can help the students to practice and learn ESL in a concrete way to support the theoretical knowledge they receive from their formal learning, without ignoring the implicit language learning that may occur while using the mobile devices for other purposes as discussed in section 2.1.2.5. The following two subsections discuss implicit versus explicit learning of ESL.

2.2.3.4. *Implicit Learning*

In order to define the concept of 'implicit learning' (alternatively referred to as 'implicit instruction'), Ellis and Shintani (2014:83) state the following:

Implicit instruction caters to incidental language learning. Learners are not told what the instructional target is but simply engage in activities that provide them with input containing the target feature and opportunities to use it in output as in task-based language teaching.

Arthur Reber introduced the research in implicit learning into the area of linguistics in late 1970s to refer to, according to Reber (1976) quoted in DeKeyser (2003:314), “a primitive process of apprehending structure by attending to frequency cues”. Winter and Reber (1994), quoted in Rast (2008:33), define implicit learning as “the human ability to derive information about the world in an unconscious, non-reflective way”.

Implicit learning and input cannot be separated as they influence each other. According to Rast (2008:34), different researchers in SLA found that implicit L2 learning cannot take place except “when a learner is exposed to a certain kind of [Krashen’s comprehensible] input”. Therefore, the language implicit knowledge is considered, according to Huot and Schmidt (1996) mentioned in Rast (2008:34), “as the inferred knowledge of how grammatical items are used in communication”. In other words, it cannot be possible for implicit learning to occur without the availability of comprehensible input.

In the context of DeKeyser (2003:314) that the implicit learning is the “learning without awareness of what is being learned”, in this research, implicit learning comprises the process of understanding the language input through learners’ different activities both inside and outside the classroom setting, and this can take the form of task-based language learning (see section 2.1.2.5).

Concerning the implicit learning of ESL, as mentioned in section 2.1.2.5, the activities which can help the students at UR unconsciously to receive more English language input, and unconsciously to understand it, include the use of electronic mobile devices for communication, social and other purposes, interacting with other English speakers, reading various books and newspapers, watching English movies, and other activities which involve the learners in using English language without considering it as part of their academic activities.

2.2.3.5. *Explicit Learning*

In contrast to implicit learning, according to Ellis and Shintani (2014:83), explicit language learning “makes it clear to the learner what is the instructional target and provides activities to assist them in learning it”. Therefore, Ellis (1994), quoted in Rast (2008:33), defines explicit learning as “a conscious process during which the individual forms and tests hypotheses with a view to finding the correct target structure”. According to Ellis and Shintani (2014:83), “explicit language instruction caters to intentional language learning in students”. Regarding the difference between implicit and explicit knowledge, Hulstijn (2005), quoted in Rast (2008:33) states the following:

Explicit and implicit knowledge differ in the extent to which one has or has not (respectively) an awareness of the regularities underlying the information one has knowledge of, and to what extent one can or cannot (respectively) verbalize these regularities.

According to Hulstijn (2002) quoted in Rast (2008:33-34), explicit learning is described as a “conscious, deliberative process of concept formation and concept linking”. And according to Rast (2008:34), explicit language learning occurs “when [language] learners are exposed to new concepts and rules, whether the information is provided by an instructor, in the form of a textbook, or by learners themselves when in a self-initiated searching mode”.

This research tried to make the UR students, especially the research participants, aware of the use of mobile technologies for ESL learning purposes, and it investigated how these technologies can contribute to the successful acquisition of ESL. Concerning explicit learning of English as a second language (ESL) at UR, the research participants comprising the experimental group were trained about the use of their mobile devices for ESL learning purposes, and different learning applications and resources (see sections 3.4.1 and 3.4.2) were consciously used with the purpose of learning and improving ESL skills.

2.2.4. SLA Theories and Tell Integration

On the theoretical side of this study, it investigated the potential contribution of MALL to the comprehensibility of ESL input by UR students. In the context of Rwanda, this research attempted to integrate Krashen's Input Hypothesis of SLA with the use of mobile technological devices.

Even though according to Krashen's Input Hypothesis, students receive adequate input from their English lecturers, the linguistic situation of Rwanda (see 2.4.2) does not expose the UR students to a rich and enough input necessary for ESL successful acquisition. As an attempt to solve this problem, this research investigated how the language input received from the formal classroom can be enhanced and understood by using mobile technologies. In accordance with the constructivist framework, this research did not consider the students' innate language acquisition abilities; it considered ESL acquisition in similar learning settings instead. It considered ESL acquisition as a process that takes place in a classroom setting, and during which the students can make use of their mobile devices in order to make the input received from the lecturers more comprehensible. In the context of connectionism, the comprehension of input by using mobile technologies was considered. This research investigated how various applications, social networks, blogs, Web 2.0 applications and other interactional facilities that are accessible from mobile device can contribute to the students' understanding of English input, and how this can contribute to successful acquisition.

2.3. Previous Research Findings on MALL

According to Burston (2013:157), "over past 20 years, project implementation descriptions have accounted for the majority of Mobile-Assisted Language Learning (MALL) publications, some 345 in total". Burston (2013:157) states the following:

Though a young field, some 575 works relating to MALL have been published over the past two decades. The topics covered are varied and include considerations of technical specifications, mobile device

ownership, pedagogical design, learning theory, user attitudes, motivational effects, institutional infrastructure, and teacher training, among others.

According to Yang (2013:19), “many researches on MALL consider the emerging mobile technologies have considerable potentials for the effective language learning”. In this context, Abdous, Camarena and Facer (2009:76) mention that “integrating mobile assisted language learning (MALL) technology... into the foreign language curriculum is becoming commonplace in many secondary and higher education institutions”. In this section, some researches about the use of mobile technologies for language learning purposes are focused on.

2.3.1. Mobile Podcasting and SLA

The use of mobile podcasting can contribute to the acquisition of a second or a foreign language. In this subsection, the focus is on the research that found how mobile podcasting can positively contribute to the acquisition of a second language, by Abdous, Camarena and Facer (2009) about the “use of academic podcasting [on mobile devices] in the foreign language classroom”.

Abdous, Camarena and Facer (2009:76) found that, in addition to improving the foreign language skills for learners, “when instructors use podcasts for multiple instructional purposes (e.g., to critique student projects and exams...), students are more likely to use this technology and to report academic benefits”.

Focusing on mobile podcasting and the acquisition of the second language (L2) skills, Abdous, Camarena and Facer (2009:84) found that “the use of podcasts contributes to the acquisition of language skills, especially oral and aural skills”. In this context, Abdous, Camarena and Facer (2009:77) state the following:

[Mobile podcasting] allows teachers to restructure classroom time and to convert the popular iPod and other MP3/MP4 players into multi-purpose teaching and learning tools to enable students to review lectures, to expand their vocabulary, and to build oral and aural skills.

2.3.2. Language Learning Outside the Classroom

According to Saran, Seferoglu and Cagiltay (2009:97), “in general in-class activities are not sufficient for effective language learning and... learners should also have input and output opportunities outside the classroom”.

In contrast to the traditional desktop computers that are only accessible from the school-owned language laboratories, the technological mobile devices “with their widespread use and their features such as mobility, localization, and personalization... offer a great potential for out-of-class learning” (Saran, Seferoglu and Cagiltay 2009:97), and have made language learning outside the traditional classroom possible.

To sum up this subsection, as discussed in section 2.1.2.4, Yang (2013:19) states that “mobile electronic devices... have been blurring the learning boundaries between classroom and home, as well as boundaries between the concept of computer and mobile devices”.

2.3.3. Multimedia and Task-Based Language Learning

As discussed in section 2.1.2.4, on the basis of the research case of Japan, Gromik (2012) found that playing with multimedia production, particularly video making on mobile phones can successfully contribute to learning English or any other foreign or second language. In the same context, with reference to the case of Iran, as discussed in section 2.1.2.3, Baleghizadeh and Oladrostam (2010) found that voice recording on a mobile device can effectively improve English language grammatical accuracy.

The use of mobile devices, especially as multimedia tools, can contribute to successful task-based second or foreign language learning (see section 2.1.2.5).

2.3.4. Mobile Devices and Learner Collaboration

The language learning process is compound system, which requires

coordination, collaboration and cooperation among its parts, namely the language learners, teachers or lecturers, as well as their physical and social environment. The use of mobile devices is potentially a sustainable tool to strengthen the collaboration within this language learning or acquisition system, particularly to facilitate the collaboration among learners. In this framework, as discussed in section 2.1.2.8, from their investigation on the use of tablets for educational purposes, the study of Lan, Sung and Chang (2007) mentioned in Yang (2013:22) found that the use of tablets “to facilitate the collaboration between peers outweighed the potential weakness hindering students’ collaboration process in a traditional setting”.

In addition to facilitating collaboration among the above-mentioned agents, communication features of mobile devices can successfully contribute to the development of different language skills. For example, as mentioned in section 2.1.2.6, Alemi, Sarab and Lari (2012) found that the use of short message service (SMS) on a mobile phone could more successfully contribute to the acquisition of vocabulary in an L2 than the use of a traditional dictionary. In addition to the use of SMS, from their study on the potential and effectiveness of using mobile phones, particularly multimedia messages, in foreign language learning and teaching, Saran, Seferoglu and Cagiltay (2009:98) found that “using mobile phones had positive effects on students’ pronunciation”.

2.3.5. Mobile Devices and Self-Editing in L2

Mobile devices help second language (L2) learners to practice the L2 not only through collaborating with other parts composing the learning system discussed in the subsection 2.3.4, but also by allowing the learners to identify their mistakes and to correct these themselves. In this subsection, the research to mention was conducted with “drawing insights from the interactionist approach to SLA, the Noticing Hypothesis, and MALL”, by Li and Hegelheimer (2013) on the use of “a web-based mobile application, Grammar Clinic, for an ESL writing class” (Li and Hegelheimer 2013:135).

According to Li and Hegelheimer (2013:149), this research found that the use of web-based mobile applications contributes to the learners' self-editing which is, as stated by Li and Hegelheimer (2013:136), "a critical step in L2 learners' writing and grammar development, as it facilitates acquisition processes and promotes learner autonomy".

2.4. Rwanda as the Field of Research

2.4.1. General Background

Rwanda is a small monolingual landlocked developing country of which the population is currently estimated at 12 million. This section highlights some of the Rwanda economic indicators as published by the National Institute of Statistics of Rwanda (NISR).

By the end of 2011, according to NISR (2012:5), the poverty rate in Rwanda was 44.9% at a national level, with 22.1% in urban areas and 48.7% in rural areas. NISR (2012:7) indicates that the percentage of the population with electricity was 46% in urban areas, and 5% in rural areas. Regarding communication structures, NISR (2012:8) indicates that the mobile phone network covers 72% of the country, and NISR (2012:77) adds that 45.2% of the Rwandan households owned a mobile phone, while only 1.7% of the households owned at least one computer. According to NISR (2012:8), 19% of people living in Kigali City, 16% of people living in other urban areas, and 2% of people living in rural areas have access to internet at their home; these percentages include access to internet via computers and mobile devices. NISR (2012:46) indicates that 83% of the Rwandan population had attended school, and NISR (2012:53) states that computer literacy rate was 3% at a national level, and 15% at Kigali City level.

To summarize these statistical data, Rwanda is a developing country where the population has more access to mobile phones than computers. However, while many Rwandans attend school, very few people are computer literate. In addition to this, the access to electricity is still low in Rwanda. The use of mobile devices in Rwandan education can be more useful than the use of computers and

other modern technological tools, as the latter require a regular access to electricity which is not accessible to most of Rwanda, in addition to its cost which is higher than that required for using mobile devices.

2.4.2. Linguistic Background

In this section, the linguistic background of Rwanda is discussed. In the first subsection that is entitled 'three living languages', general information about Kinyarwanda, French and English in Rwanda is given. The ways in which these languages are used, and their status as national and official languages, are explained, before the second subsection, in which the emphasis is on English language acquisition that is the focal point of this research.

2.4.2.1. *Three Living Languages*

According to Article 5 of the Constitution of the Republic of Rwanda as adopted by referendum of 26th May 2003, and amended on 2nd December 2003, 8th December 2005, 13th August 2008 and 17th June 2010, Rwanda uses Kinyarwanda as the only national language, and Kinyarwanda, French and English as the three official languages (Republic of Rwanda 2010).

Regarding the language use and practices, according to Rosendal (2009), LeClerc (2008) and Munyankesha (2004) mentioned in Samuelson and Freedman (2010:193), "as high as 99.4% of the population [of Rwanda] can speak Kinyarwanda, and approximately 90% of Rwandans speak only Kinyarwanda". This fact that Kinyarwanda is the majority language in Rwanda makes it the sole national language, and the first of three official languages. In different analyses done during their research program entitled 'Living and Working in Three Languages in Rwanda', Gafaranga, Niyomugabo and Uwizeyimana (2013:314) found that even "in the Constitution [of Rwanda], Kinyarwanda is seen as the dominant official language while the other languages [namely English and French] can be seen as auxiliary languages".

As a dominant language, the mother tongue or first language (L1) of almost

every Rwandan, Kinyarwanda is used to show the “Rwandan-ness” (Samuelson and Freedman 2010:192), the Rwandan national identity and culture, and unity among the Rwandan population. This status can be officially confirmed by the verse from the Rwanda National Anthem, “ururimi rwacu rukaduhuza”, which means ‘our [Kinyarwanda] language unites us’.

As far as French is concerned, Gafaranga, Niyomugabo and Uwizeyimana (2013:315) state that it is the second official language of Rwanda as a Belgian “colonial legacy”. Belgians who colonized Rwanda since 1890 until its independence on July 1st, 1962 brought the French language to Rwanda, and it was seen as “the language of prestige and political power” (Samuelson and Freedman 2010:193) as well as the language of an intellectual person until the 1990s. After introducing English as the third official language in 1996, the status of French declined until the end of 2008 when, according to Samuelson and Freedman (2010:191), “international news coverage focused on Rwanda’s announcement that it was discarding French as one of its three official languages”, the language which is spoken in addition to Kinyarwanda, according to Rosendal (2009) mentioned in Samuelson and Freedman (2010:194), by “3 – 5% of Rwandans”.

2.4.2.2. English as the Research Target Language

This research emphasized the acquisition of the English language that is the third official language of Rwanda. According to LeClerc (2008) and Munyankesha (2004), mentioned in Samuelson and Freedman (2010:194), the “estimates of the percentage of [Rwandans who can speak] English... today range from 1.9 – 5%”.

Concerning the history of English as the third official language of Rwanda, Gafaranga, Niyomugabo and Uwizeyimana (2013:315) say that “English was first allowed official use in Rwanda in the context of the Arusha Peace Accord [signed in 1993] on a temporary basis and declared the third official language as of January 1996”. Focusing on the current status of the English language in Rwanda, Gafaranga, Niyomugabo and Uwizeyimana (2013:315) mention the following:

The introduction of English in the Rwandan sociolinguistic scene was occasioned by the return, at the end of the Rwandan civil war (October 1990 – July 1994), of former refugees, many of whom had lived in English speaking East Africa since the late 50's. And its promotion to the status of official language is closely linked with the growing influence of these former refugees in the life of the country. As for its actual penetration, an even tinier minority of Rwandans, reportedly less than 3 %, have any competence in English.

In addition to its status as an official language, since 2009, English has been used as the language of instruction at all levels of formal education in Rwanda, while both Kinyarwanda and French still remain as optional subjects. With regards to the use of languages in Rwandan education before 2009, Kagwesage (2013:2) says the following:

Language in education policy in Rwanda has dramatically changed over the last few years. Before 1994, the language of instruction in primary schools was Kinyarwanda and French in secondary and tertiary education. Since 1995 the Government of Rwanda decided to create a 'trilingual' society, introducing English as an official language and medium of instruction in addition to Kinyarwanda and French. Until 2008, both English and French were used as media of instruction in higher education depending on the lecturers' linguistic abilities. At the same time, students with language problems were given support courses either in English or French depending on where they had problems.

About the language shift of 2009, from multilingual education to monolingual policy in which only English is used as a language of instruction, the Rwanda Education Board (REB 2014:4) states the following:

In 2009, the Government of Rwanda decided to change from French to English as the medium of instruction, one of the most challenging experiences Rwanda's education system has faced. The change has been necessitated by Rwanda's vision for education, business and

trade, and regional and international relations as ICT development propels Rwanda's economy to a middle-income status by 2020.

According to Samuelson and Freedman (2010:192), "the Rwandan government is justifying the switch to English as a medium of instruction by pointing to the global and regional growth of English as the leading language of science, commerce and economic development".

Considering the small percentage of people who speak English, with reference to the fact that the current technologies are as quickly developing in Rwanda as in any other country, with the consideration of the status which English language has, as well as the role that it currently plays in Rwanda, this research has been designed with the purpose of investigating the possibility to increase the ESL success rate by using MALL.

2.5. Technology for Language Learning in Rwanda

In order to build a knowledge-based economy, Rwanda is investing in the use of modern technologies in education. Various projects aimed at designing and making available both mobile devices and applications to be used for educational purposes are being implemented, and two examples, one of a project on devices, and another on applications, are discussed in this section.

2.5.1. One Laptop Per Child

As one example of mobile learning projects aimed at making mobile devices more available, according to D'Amico (2012:2), at the end of 2007, the Government of Rwanda, through the Ministry of Education (MINEDUC), started working with the 'One Laptop Per Child' (OLPC) project, which is "a non-profit organization that has introduced the one to one modality in the use of computers for education in many developing and poor countries" (Battro 2013:133).

OLPC distributes laptops to children (see Figure 2.1 for children using laptops in a formal classroom, and Figure 2.2 for informal use) and teachers, so that they are able to benefit from the mobility (see section 2.1.2.6) and portability (see section 2.1.2.4) features of mobile technological devices. According to D'Amico (2012:2), the number of "laptops deployed [by OLPC in Rwanda] as of 10 January 2011 [was] 110,000", and "by 2017, Rwanda intends to distribute half a million laptops to primary school students" (D'Amico 2012:4).

In the context of advantages of mobility and portability features to the successful process of learning and teaching, Battro (2013:133) states the following:

[OLPC] is based in the idea of an expanded school where each child and teacher owns his or her own laptop connected to the Internet. Children spontaneously work in collaboration and teach each other in many different settings at school, at home and in public places. Teachers are not limited to work in a computer lab or computer class in restricted periods of time and are able to coach the development of neurocognitive skills of each cohort of students. The one to one modality reflects a vision of social equity that is beyond sharing arrangements.

In the Rwandan context, according to MINEDUC (2014:1), OLPC is "a key project that aims at the enhancement of education through the introduction of technology in primary schools". As far as the importance of OLPC in Rwanda is concerned, MINEDUC (2014:1) mentions the following:

[OLPC] allows primary school students early access to computer skills and computer science understanding while expanding their knowledge on specific subjects like science, mathematics, languages and social sciences through online research or content hosted on servers.

About the success of OLPC, Battro (2013:134) states that by successfully implementing the OLPC in developing and poor countries, Rwanda included, "the old model of a computer laboratory... has been replaced in many places by the extended school that includes connected laptops at home as well as in class".

Implementing OLPC project in Rwanda, according to D'Amico (2012:4), “resulted in a reduction in the number of students missing classes; increased student engagement in searching for information for schoolwork; and a greater family involvement in the day-to-day education of children”.



Figure 2.1: Children using OLPC computers during their studies in Rwanda (MINEDUC 2014:1)



Figure 2.2: A child playing with multimedia files on a laptop in Rwanda

However much has been done, OLPC project in Rwanda has some challenges such as, according to D'Amico (2012:8), "lack of electricity and Internet connectivity in schools and in homes; lack of servers for networked applications; lack of spare parts and technicians for laptop maintenance and repair". As it is discussed in the following subsection 2.5.2, the introduction of a learning application that can be used from mobile phones may be one of the possible solutions to the challenges associated with the use of laptops.

2.5.2. SocialEDU

As introduced in section 2.5, in addition to OLPC, there are many mobile learning projects currently being designed and implemented by the Government of Rwanda in partnership with various investors. This section will discuss SocialEDU as one of the projects aimed at developing and making available the applications to be used on mobile devices for learning purposes in Rwanda.

Chapple (2014) reports on the Mobile World Congress that took place from 24th to 28th February 2014 at Barcelona in Spain, on SocialEDU which is a mobile application for education in Rwanda. Chapple (2014) indicates that Facebook and EdX will create the application, while Airtel, a telecommunication company operating in Rwanda, will provide free Internet data for educational purposes to those who will be using the application. Nokia will provide discounted smartphones, and the Government of Rwanda will expand its free wireless Internet connection on campuses, and provide the financial opportunities for students to buy the smartphones. According to Chapple (2014), through interactive lessons "SocialEDU students [in Rwanda] will receive access to education from universities such as Harvard, Massachusetts Institute of Technology, Berkeley and others".

Because of the tax exemption on ICT related equipment including computers and their accessories, and because of the cheap Chinese smartphones, especially the ones supplied by Tecno Telecom Ltd. and Konka Group Co. Ltd. available on the Rwandan market, the use of mobile technologies and access to Internet are increasing very fast in Rwanda. Social networks are used to transmit information

among people, government agencies, private and public institutions, as well as non-governmental organizations. The following screenshots are two examples of how Twitter, as one social network, is used to transmit information about the SocialEDU project in Rwanda.



Figure 2.3: Link to CNN article published on the Government of Rwanda official twitter account¹ on February 24th, 2014 (Screenshot of February 25th, 2014)



Figure 2.4: Link to CNN article published on an individual twitter account² on February 24th, 2014 (Screenshot of February 25th, 2014)

¹ <http://www.twitter.com/RwandaGov>

² <http://www.twitter.com/VUwizeyimana>

This research did not investigate the use of social networks for general purposes, neither for information and advertisement purposes. Being located in the field of TeLL, based on the case of UR, this research attempted to find out how the use of social networking on mobile devices and other mobile online and offline applications (see sections 3.4.1 and 3.4.2) can help students in Rwanda with their acquisition of English as a second language (ESL).

2.6. SLA Theories in Rwandan Context

As stated above, Rwanda is officially a multilingual country. As far as the language statuses in Rwanda are concerned, Samuelson and Freedman (2010: 192-195) describe Kinyarwanda as “the everyday language”, French as “the colonial inheritance”, and English as a symbol of “new identities and ideologies”. Except for Kinyarwanda, other languages are spoken only in classroom settings, and in very few international organizations active in Rwanda, specifically when interaction involves a foreign person.

The acquisition of ESL at tertiary level in Rwanda can be theoretically understood with reference to adult second or foreign language acquisition, as contrasted to the acquisition of Kinyarwanda which can be understood with reference to the child L1 acquisition. With reference to Krashen’s Input Hypothesis, the child and adult differences in language acquisition success can be explained, according to Bley-Vroman (1990:25), as follows:

Many adults trying to learn a foreign language, especially in a country where the language is not spoken and in a course which meets just a few hours a week for a year or two, obviously are exposed to much less language input than the average child.

The Rwanda Education Board (REB) that coordinates, in collaboration with the Ministry of Education (MINEDUC), the entire education system in Rwanda, including the management of technologies in education, introduced the use of mobile multimedia tools for learning purposes. In this regard, as successful ESL acquisition is one of the priorities in the education sector in Rwanda, REB (2014:7) states the following:

Interactive audio lessons allow children to listen to fluent English speakers daily and model active, communicative second language learning for teachers. Lessons also guide children in reading levelled texts, which they read every day in class and at home. The texts include simple stories tied to the sounds studied and skills emphasized that week.

Krashen (1982:63) says that no language acquisition can take place without understanding the input; and REB (2014:7) says that “in learning to read, it’s important that children have constant exposure to written content... The program ensures that children read something new every day and also have opportunities to re-read text to develop fluency”. Focusing on the way interactive lessons contribute to ESL input in a Rwandan classroom, REB (2014:7) says that some which “are supported by an audio program, use games and activities to help learners understand the new language as well as develop speaking and listening comprehension skills”.

Although many academic programs have been developed and implemented in Rwanda, university students still do not have enough facilities, enough qualified lecturing and tutoring staff members, and enough lecturing time to enable them to adequately develop ESL output. This situation implies that almost all problems found in the process of ESL acquisition in Rwanda may be based on the lack of input comprehension, the challenge that can be addressed by exploiting the affordances built into MALL.

Krashen (1982:64) states that “the main function of the second language teacher is to help make input comprehensible, to do for the adult what the outside world cannot or will not do”. At the UR, the use of electronic devices by students can assist in that role which is mostly played only by the university English language lecturers. Various applications, including online English resources such as websites and databases, online and offline dictionaries and translators for example, if they are well used on mobile electronic devices, can help UR students to receive more input and to develop an understanding of the input received within their ESL acquisition process. Through MALL, students can always be

exposed to a rich ESL input, and interact with others within the process of input comprehension and enhancement.

2.7. Conclusion

According to Inglis, Ling and Joosten (2000:16), the current “technological development drives globalization, [and] globalization demands the breaching of time and space limitations and draws upon information technology”.

As far as language learning is concerned, Burston (2013:157) states that “there has been an interest in freeing learning from the constraints of time and place”. In this framework, the use of technological tools, including mobile devices, has been introduced in formal language learning and teaching.

Because of its openness, especially in matters of time and place, mobile assisted language learning (MALL) is a potential way of acquiring any second or foreign language in either a formal or an informal setting. In this regard, MALL is defined by Chen (2013:21), as “the formal or informal learning of a foreign [or a second] language with the assistance of mobile devices”. And according to Abdous, Camarena and Facer (2009) and Sharples (2009) cited in Chen (2013:20):

The ubiquitous availability of portable devices, including mobile phones, laptops, tablets, and multimedia players has changed foreign [and second] language instructional methods and learning strategies with today’s students, with mobile learning... emerging as the next generation of electronic learning.

In order to provide a possible contribution to the successful acquisition of ESL in Rwanda, this study was designed. The integration of second language acquisition (SLA) theories and MALL, and an investigation into the case of a developing and multilingual African country as it was recommended by Dang (2013), this study can hopefully contribute to the field of technology for language learning by filling the gap in the available literature (see section 2.1.2), and by verifying the SLA theory (see section 2.2) in the context of the current mobile digital world.

Chapter 3: RESEARCH DESIGN AND METHODOLOGY

For an academic study to be successful and to attain its objectives, it has to be well planned in advance, and to respect the relevant scientific research methods. In this third chapter, the methods that were used for data collection and analysis are explained; the research population and sample, as well as the used sampling strategy are discussed. The procedures followed for obtaining the research permission and ethical clearance are set out and, at the end of this chapter, the research time frame as well as the budget are presented.

3.1. Mixed-method Approach

This research was a case study of students learning English as a second language (ESL) at the University of Rwanda (UR). According to Stark and Torrance (2005:33), “case study assumes that social reality is created through social interaction, albeit situated in particular contexts and histories, and seeks to identify and describe before trying to analyze and theorize”. In order to elicit and collect the research data on MALL successfully, as discussed in section 3.4.3, the researcher created a conducive environment to not only a well prepared control group, but also to a comfortable social interaction among the research participants and the researcher.

Within this research, a mixture of quantitative and qualitative methods of data collection and analysis was used. The mixed-method approach is defined by Greene, Kreider and Mayer (2005:274) as “the planned use of two or more different kinds of data gathering and analysis techniques, and more rarely different kinds of inquiry designs within the same study or project”.

The use of mixed-method approach was preferred in the framework of Greene, Kreider and Mayer (2005:275) who state that “mixed-method approaches to social inquiry [have been] advanced as uniquely able to generate better understanding than studies bounded by a single methodological tradition”.

3.1.1. Quantitative Methods

On the quantitative side of this research, a questionnaire (see Appendix 1) was used for data collection, and quantitative methods were used for analysing the collected data. The questionnaire was distributed online to UR undergraduate students who take English language as one of their major courses in the Faculty of Arts and Languages at the College of Education located in Kigali City, in Rwanda.

According to Sharples (2009), mentioned in Chen (2013:28), “a useful way to approach the evaluation of mobile assisted language learning (MALL) technology is to address its usability (will it work?), effectiveness (is it enhancing learning?), and satisfaction (is it liked?)”. By integrating Sharples’ approach and considering Krashen’s input hypothesis, the questionnaire was used to assess whether the use of mobile devices contributes to the acquisition of ESL, and this was done with consideration of the following six requirements for optimal input as provided by Krashen (1982:163-169):

- 1) Comprehensible
- 2) Interesting / relevant
- 3) Not grammatically sequenced
- 4) Quantity
- 5) Filter strength
- 6) Tools for conversational management

Focusing on the design of the research questionnaire (see Appendix 1), in addition to the section regarding the background information on the participants, one section on MALL and optimal input, and another on Sharples’ approach in the context of Rwanda were added. As far as optimal input is concerned, the questions of which aim was to reveal how MALL can help the students to obtain a rich English input, which meets the six requirements mentioned above, were formulated. And concerning the Sharples’ approach, three questions were added to evaluate MALL usability and effectiveness in

Rwanda, as well as students' satisfaction with using mobile devices for English learning purposes.

According to Levy and Stockwell (2006:108), "knowledge of the learners' experience is essential in determining how the students will be able to handle the medium in their language learning". In this framework, a short written test of English (see Appendix 2) was administered to the research participants one time in October 2014. The test was done online through SUNLearn, which is the Stellenbosch University electronic learning environment accessible from <http://www0.sun.ac.za/elearn>. It was done by the use of mobile devices and other technological devices that could be connected to Internet. All the research participants composing both experimental and control groups (discussed in section 3.2.1 and section 3.2.2 of this thesis) were requested to answer to the questionnaire (see Appendix 1) and to complete the test (Appendix 2). This test helped the researcher to determine the contribution of using mobile devices on students' performance in an ESL examination at UR.

3.1.2. Qualitative Methods

According to Levy and Stockwell (2006:40), "language teachers want to be able to assess student attitudes and perceptions in a learning environment that involves technology". Questionnaires, observations and unstructured interviews were used for elicitation and collection of data about the UR student attitudes towards using mobile devices for language learning purposes (see Chapter 4 for more details).

3.2. Sample and Research Population

The population for this project was composed of students who take English language as one of their major courses at UR. Due to the limitations especially in time and budget (see section 1.5), the research sample was selected from only

the Faculty of Arts and Languages, at the College of Education, located at Kigali in Rwanda.

In selecting the research sample, specifically the experimental group, the purposive sampling strategy was used because it gives the freedom to researchers to choose the sample size and to set the requirements for participants. According to Lewin (2005:219), “in purposive sampling, cases are handpicked for a specific reason such as use of a new product”. In the same framework, Cohen, Manion and Morrison (2011:156) state the following:

In purposive sampling, ... researchers hand-pick the cases to be included in the sample on the basis of their judgment of their typicality or possession of the particular characteristics being sought. In this way, they build up a sample that is satisfactory to their specific needs.

The reason for selecting a specific student at UR as the research subject to be included in the experimental group was the use of a mobile device for English as a second language (ESL) learning purposes as recommended by the principal researcher (see section 3.4 for more details).

3.2.1. Experimental Group

The experimental group of this research was composed of students from UR, College of Education at Kigali, who were trained by the researcher about the use of mobile devices for language learning purposes. During a three-week period, starting from 28th July 2014 to 15th August 2014, the principal investigator met and trained 13 undergraduate students, all registered for the combination of English and French languages with Education at the former Kigali Institute of Education, currently the College of Education of UR, Kigali campus. The training was on how to use mobile technological devices for English language learning purposes, with the focus on the mobile applications and tools discussed in the sections 3.4.1 and 3.4.2 of this thesis. The trained students make up the experimental group of this research.

3.2.2. Control Group

In order to avoid the problem that may arise due to the use of “only one group of students” as the research participants, Ferris (2010), mentioned in Li and Hegelheimer (2013:148), “has recommended the use of a control group to investigate the effect of [mobile-assisted language learning]... in corrective feedback research”. It is in this context that in addition to the research experimental group discussed in Section 3.2.1, a group of 11 students, also studying English and French with Education at the College of Education of UR, in the same department and academic program as the experimental group members, but who were not trained on the use of mobile technologies for language learning purposes, were selected as the control group of this research. They were requested to complete the online research questionnaire (see Appendix 1), and to do the same evaluation test (see Appendix 2) administered to the experimental group.

3.3. Ethical Considerations

3.3.1. Introduction

As this research involved human beings, institutional ethical clearance, and obtaining informed consent, as well as research permission were required; and they are discussed in the following subsections.

3.3.2. Ethical Clearance and Informed Consent

Concerning research ethical clearance, Piper and Simons (2005: 56) state the following:

In some disciplines research proposals have to pass through ethical committees, which judge not only whether the research is sensitive to human subjects but in many cases also whether the methodology is sound and appropriate for the research in question.

As far as this study is concerned, the ethical side was considered both at the Ministry of Education in Rwanda (MINEDUC) on behalf of the University of Rwanda (UR) and at Stellenbosch University; the research proposal and the completed ethics clearance application forms were submitted to the Ethics Screening Committees of both Stellenbosch University and the Ministry of Education of Rwanda (MINEDUC) as discussed in the following section 3.3.3.

According to Cohen, Manion and Morrison (2011:77), “much social research necessitates obtaining the consent and cooperation of subjects who are to assist in investigations and of significant others in the institutions or organizations providing the research facilities”. After obtaining institutional research permission (discussed in section 3.3.3), the participants granted the researcher the authorization to use the data for academic purposes by signing an informed consent form (see Appendix 10). The presentation and analysis of this research data was done in the way that the participants’ anonymity and confidentiality were respected as determined on the consent form (see Appendix 10). According to Cohen et al. (2011:77), informed “consent... protects and respects the right of self-determination and places some of the responsibility on the participant should anything go wrong in the research”. In this regard, an informed consent (see Appendix 10) was formulated and respectively signed by the research participants and the researcher.

3.3.3. Research Permission

As mentioned in section 3.3.1, this study involved participants from UR and an investigator from Stellenbosch University, and it necessitated institutional permission to access the research participants in Rwanda and to collect data from them. According to the Rwandan ministerial instructions N° 003/2010 of December 9th, 2010 regulating the research activities in Rwanda, especially its Article 6, research permission has to be obtained from the General Directorate of Science, Technology and Research in the ministry in charge of research, currently the Ministry of Education (MINEDUC 2010), at the submission of the

complete application file which includes the research affiliation letter from the participating institution, which was UR for this study.

This section discusses the process which was followed for obtaining this study permission, the process that is summarized in the following Figure 3.1:

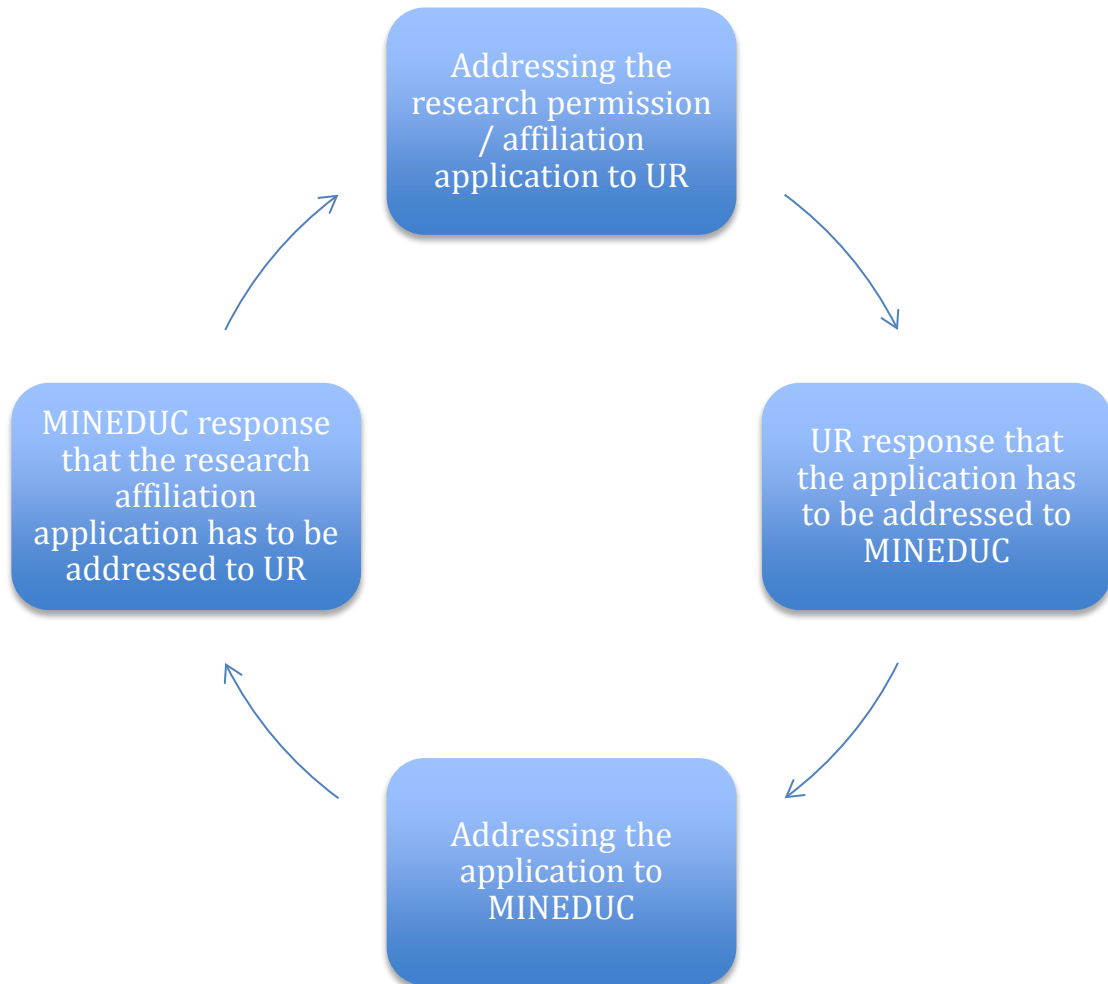


Figure 3.1: Cycle of the research permission application process

As it is presented on Figure 3.1, the process of obtaining the official authorization to conduct this academic research on UR students in Rwanda was almost a 'vicious cycle'. As the first step, the application for permission to collect data from the UR was submitted to the Principal of UR (Appendix 3) with the supporting documents, which include the recommendation from the supervisor of the research (Appendix 4). The UR feedback was that such application had to be addressed to the Ministry of Education (MINEDUC) of Rwanda (Appendix 5).

The second step was to submit a similar application to the MINEDUC. The MINEDUC expressed appreciation for the research project, but recommended that the application should be addressed to the UR (Appendix 6).

To close the cycle, the third step had been to re-submit the application to UR with a copy for information to the Ministry of Education (MINEDUC). At that point, with reference to all the previous correspondences, the application was resent to the UR with little amendment on the application subject (Appendix 7).

To restart the cycle, the research affiliation was obtained from the UR (see Appendix 8), and was addressed to the MINEDUC for permission to conduct the research in Rwanda. And at that point, the MINEDUC research authority application form (Appendix 9) was completely filled in, accordingly signed, and submitted with all the required documents to the ministry by the principal researcher, the government institution that issued the research ethical approval N° 2128/12.00/2014 (Appendix 11) and the research permit N° MINEDUC/S&T/256/2014, officially granted within the letter N° 2129/12.00/2014 (Appendix 12).

3.4. Data Elicitation Techniques

The data for this research were collected through questionnaires and student performance tests (see Chapter 4 for details). As discussed in section 3.2.1, prior to the distribution of the questionnaire, a preliminary meeting with students and training about the use of mobile devices in language learning, with emphasis on ESL, took place at UR, College of Education. The focus was on the use of various online and offline English language learning resources and applications for English language input processing purposes. The following subsections present some of the applications that were used, but the practice was not limited to only the applications and resources listed; i.e. the discovery of more applications and resources was recommended to the students by the researcher.

3.4.1. Online English Language Learning Resources

- **Wikipedia** was used as one example of a wiki. It is accessible from <http://www.wikipedia.org>.



Figure 3.2: Wikipedia on Safari browser for iPhone (Screenshot of June 24th, 2014)

- **Google** was used as one example of a research engine. It is accessible from <http://www.google.com>, and it is tailored according to the users' locations, a feature which helps the users to obtain important information, for instance on weather and trending news, faster.

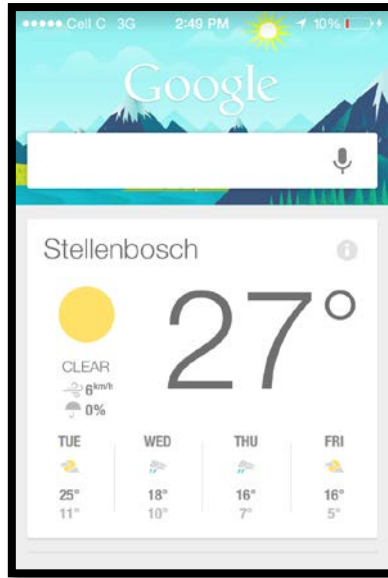


Figure 3.3: Google search on iPhone (Screenshot of June 24th, 2014)

- **Dictionary.com** is an online dictionary, accessible from <http://www.dictionary.com>, which contains a thesaurus, a reference database, a translator, a quote database, and word dynamo challenges to help the users to learn and play with new English words. And it has a free offline application for Android and iOS smartphones and tablets.

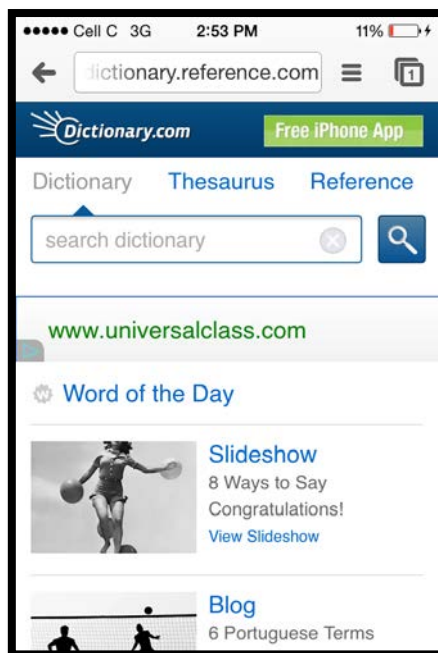


Figure 3.4: Dictionary.com on Chrome browser for iPhone (Screenshot of June 24th, 2014)

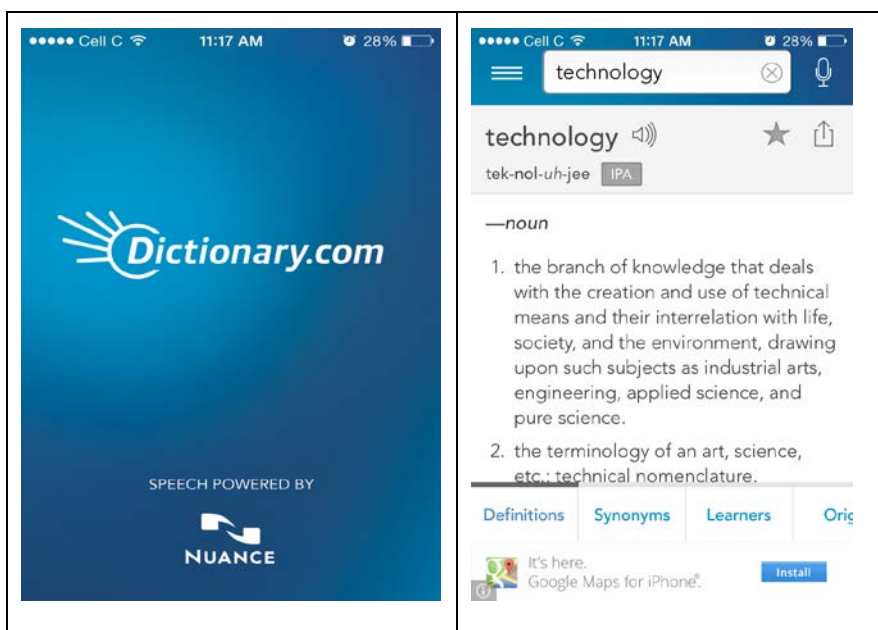


Figure 3.5: 'Dictionary.com' offline application on iPhone (Screenshots of September 1st, 2014)

- **Learn English Professionals** is a British Council initiative providing free multimedia English language learning materials, and exercises that help the users to learn or improve their academic and general writing skills in English. All the materials are accessible from their website, which is <http://www.britishcouncil.org/learnenglish>.

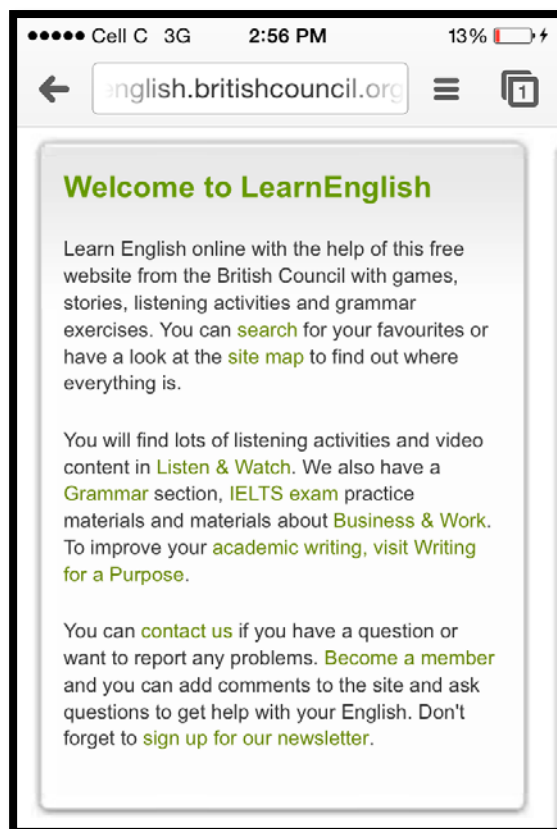


Figure 3.6: Learn English Professionals on Chrome browser for iPhone (Screenshot of June 24th, 2014)

3.4.2. Offline English Language Learning Applications

- **Talk to Me** is a speech-to-speech translation application, which is available for free for Android, BlackBerry and Windows mobile devices. It also translates text to text or speech, and vice-versa. It is also available for iOS users on payment of 1.99 USD.

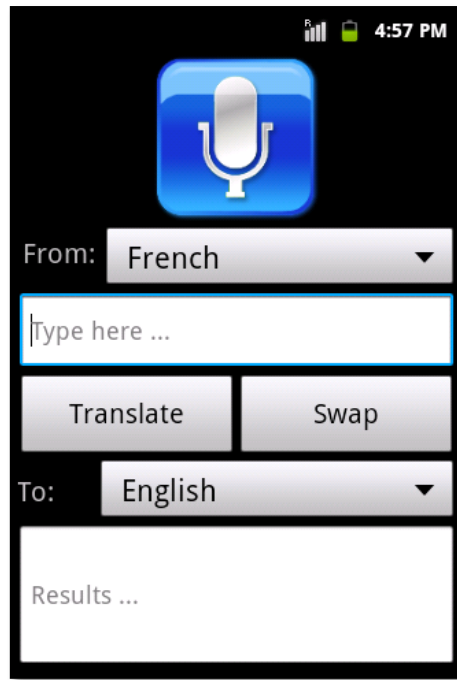


Figure 3.7: 'Talk to Me' on Android smartphone (Screenshot of June 24th, 2014)

- **Oxford Dictionary** is available as a free offline English language dictionary application for BlackBerry, Android and Windows, and it is a paid offline application for iOS mobile devices.

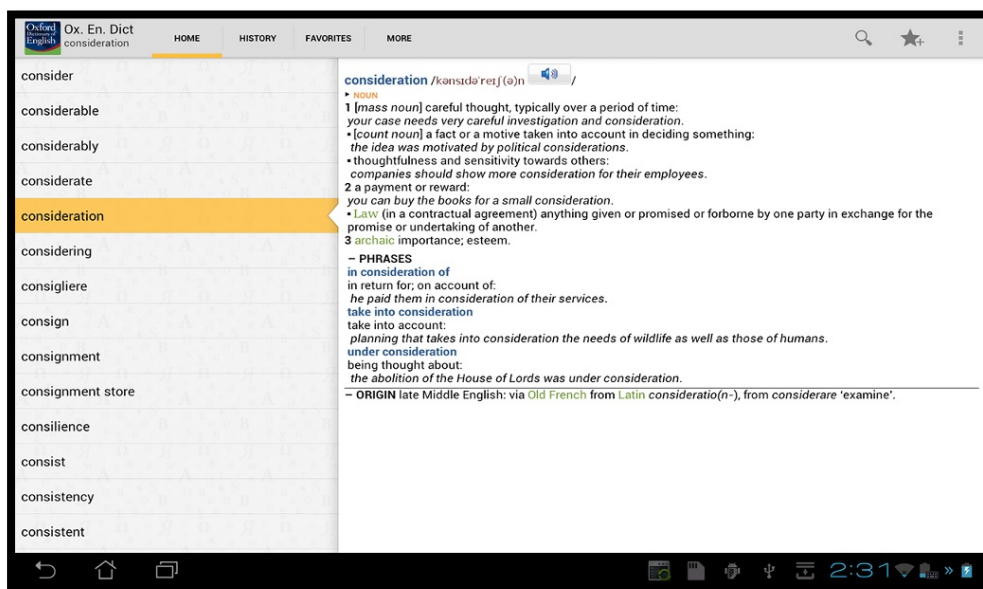


Figure 3.8: Oxford English dictionary on Android tablet (Screenshot from Google Play store)

- **Translate** is a free speech and text translation service powered by Google. It works offline and online with both speech-to-speech or text, and vice-versa, and it works with the translation of handwritten texts. ‘Translate’ turns www.translate.google.com into a smart free offline mobile application, when the user downloads the most recent version of the application as well as the applicable language files to the device.

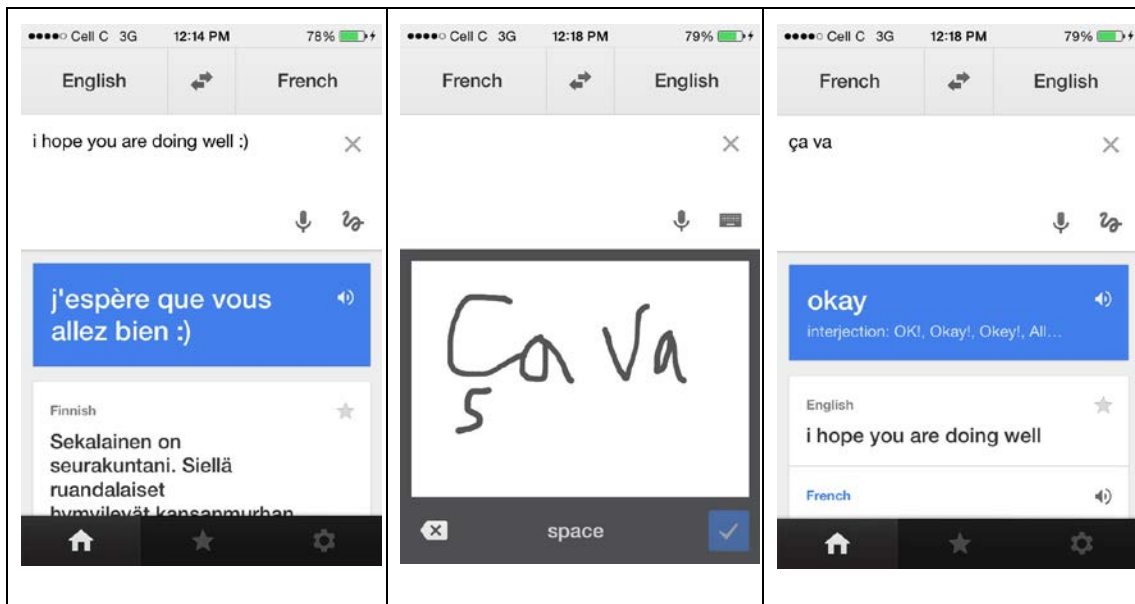


Figure 3.9: Text and handwriting translation by ‘Translate’ on iPhone (Screenshots of June 24th, 2014)

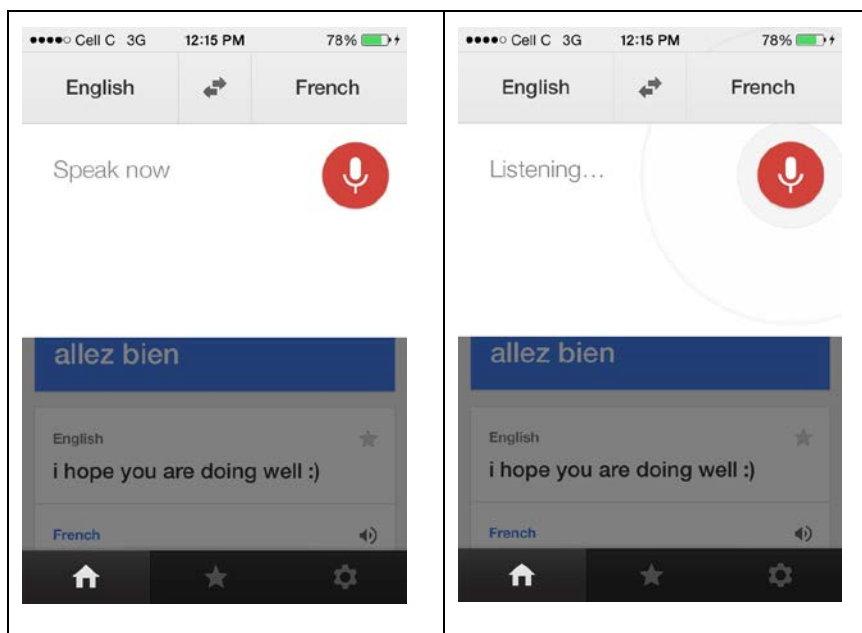


Figure 3.10: Online voice translation by ‘Translate’ on iPhone (Screenshots of June 24th, 2014)

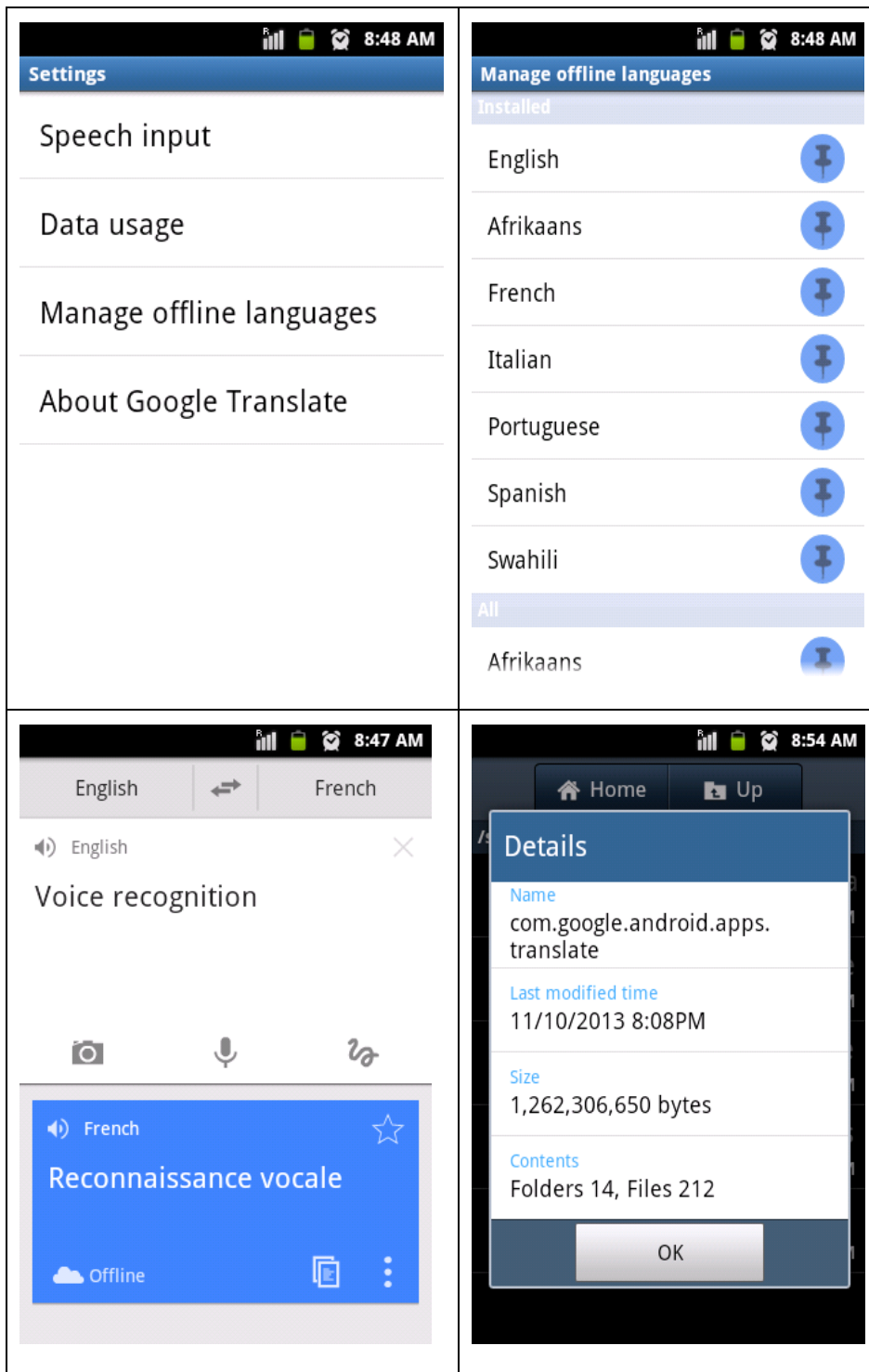


Figure 3.11: Offline use of 'Translate' on Android smartphone (Screenshots of June 26th, 2014)

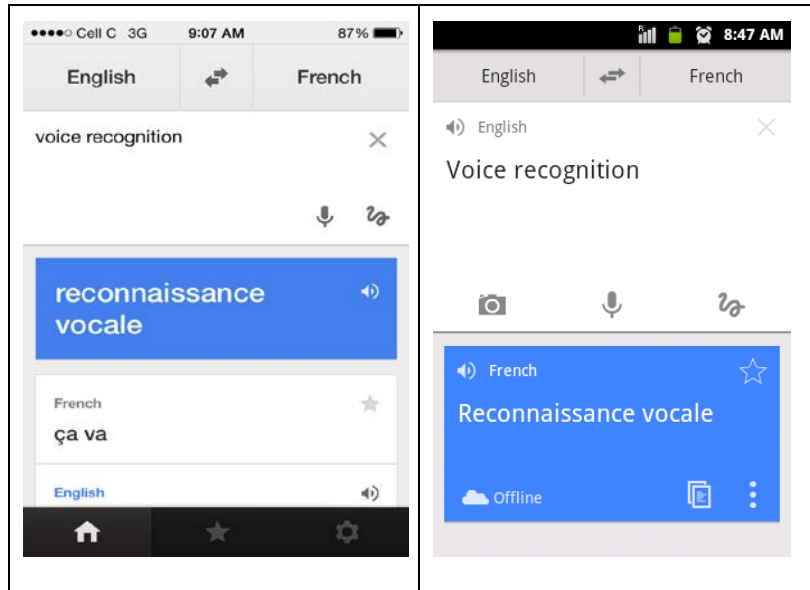


Figure 3.12: Comparison of online and offline use of ‘Translate’ respectively on iPhone and Android smartphone (Screenshots of June 26th, 2014)

- **Merriam-Webster**, like ‘Oxford Dictionary’ and ‘Dictionary.com’, is a free offline English language dictionary application for all mobile technological devices.

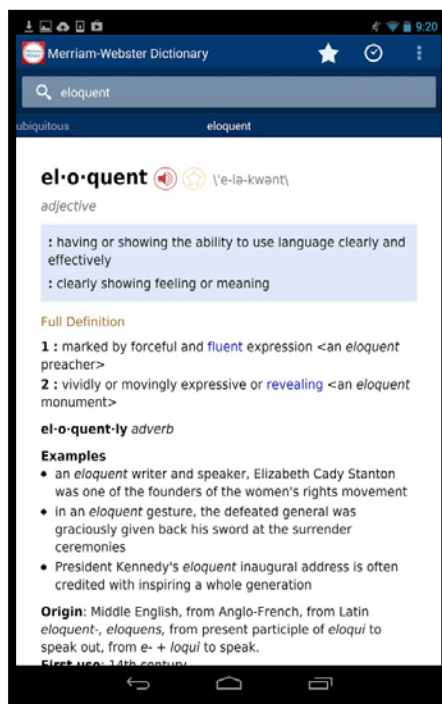


Figure 3.13: Merriam-Webster dictionary on Android smartphone (Screenshot from Google Play store)

- **enTeacher** is an application which contains various tests and exercises for English language learning at different levels. Through this application, a mobile device user can easily obtain new comprehensible input, and have opportunity to practice the use of new vocabulary items in different contexts. The 'enTeacher' application also helps the user to learn English grammar.

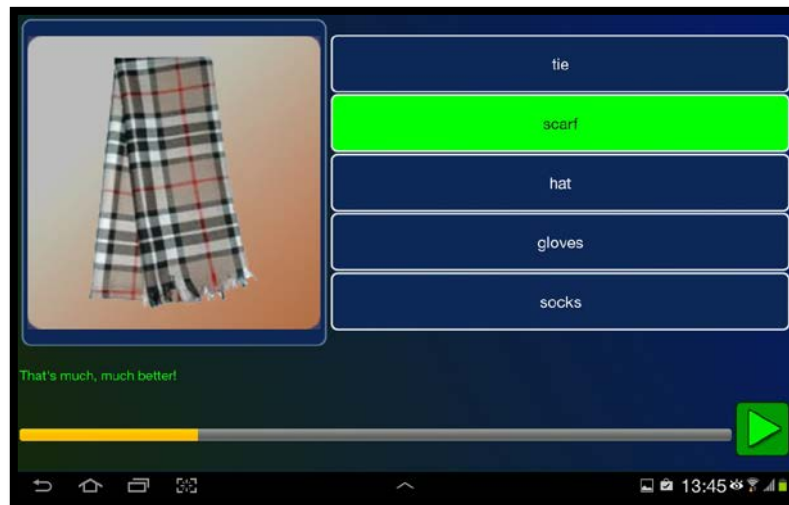


Figure 3.14: 'enTeacher' word game on an Android tablet (Screenshot from Google Play store)

3.4.3. Procedures

The students composing the experimental group of this research were introduced to, and assisted on the use of the language learning tools on their mobile technological devices, of which some tools were mentioned in the previous subsections, as well as how they can find many others on their own. And it was noticed that some applications such as Google Translate, as shown on Figure 3.11, require a lot of Internet data in order to be downloaded to the user devices. The students used the free wireless Internet connection available on campus, as well as the free wireless hotspots that cover almost the entire Kigali City and that are even accessible from inside some public transport buses in Kigali City where this research was geographically located.

Social networks such as Facebook and Twitter were informally used in the framework of Joosten (2012:5), according to whom “mobile devices can play an important role in facilitating the use of social media for teaching and learning. Many social media have functions that allow students to receive and send text messages or updates through mobile... applications”.

According to Chickering and Gamson (1987) cited in Joosten (2012:3), “good practices in undergraduate education include encouraging contact between students and faculty, developing a reciprocity and cooperation among students, and encouraging active learning”. And Joosten (2012:3) states that “social media have the potential to enhance these good practices”. In this regard, the informal use of Facebook and Twitter was introduced, according to Joosten (2012:35-75), to play the following main functions that are relevant in English language learning:

- Increasing communication and encouraging contact,
- Developing a richer learning experience, and
- Building cooperation and feedback through dialogue.

In addition to these three main functions, Joosten (2012:40) states that social networks such as Facebook and Twitter “provide an alternative method to deliver course updates to students”. Joosten (2012:44) summarizes the benefits of using social media as a tool to deliver course updates in a formal learning setting as follows:

<ol style="list-style-type: none">1. Increases interactions between instructors and students2. Enhances communication3. Builds feelings of connectedness4. Overcomes the challenges of students at a distance or in remote locations5. Facilitates providing timely student feedback6. Helps students performance7. Increases student performance8. Provides a medium for instructors to enhance their identity and encourage students9. Results in high levels of satisfaction of instructors and students

Table 3.1: Benefits of social media for course updates (Joosten 2012:44)

At the end, the collected data were qualitatively and quantitatively analyzed, presented in charts. And by integrating the use of mobile technological devices with second language acquisition (SLA) theories discussed in Chapter 2 of this thesis, particularly the input hypothesis, this research findings are discussed in Chapter 5.

Chapter 4: DATA COLLECTION TOOLS

As mentioned in the previous chapter (section 3.1), this study is a case study, and it uses the combination of qualitative and quantitative methods of data collection and analysis. This chapter focuses on different tools that were used to collect both the qualitative and quantitative data, namely questionnaire, evaluation test, observation, and informal interviews.

4.1. Questionnaire

Bradburn, Sudman and Wansink (2004:360) state the following about the concept of 'research questionnaire':

[A research questionnaire is] the complete data collection instrument used by an interviewer or respondent (or both) during a survey. It includes not only the questions and space for answers but also interviewer instructions, the introduction, and cards used by the respondent.

In this section, details about the structure and the administration procedures of this research questionnaire are provided.

4.1.1. Structure

As mentioned in section 3.1, the questionnaire was used to collect both the qualitative and quantitative data. Focusing on its technical design, it comprised of three sections (see Appendix 1). The first section focused on background information of the research participants, the second on the integration of mobile assisted language learning (MALL) and Krashen's input hypothesis of second language acquisition (SLA), and the last on Sharples' approach of the evaluation of MALL by students at UR.

For the successful design of a research questionnaire, Bradburn, Sudman and Wansink (2004:20) state that a researcher "will need to identify the concepts

involved in the research question, then... formulate specific questions that, when combined and analysed, will measure these key concepts”.

In this regard, the concepts were identified, and the questions were formulated. The tables provided in Appendix 1 explain this research questionnaire by illustrating the variables studied, with the corresponding questions, as well as the evaluation measures that were used.

4.1.2. Administration

Traditional printed questionnaires are outdated and costly to administer. According to Bradburn, Sudman and Wansink (2004:360), “traditionally, the questionnaire has been printed, but more recently electronic versions are being used on computer terminals”. And Sue and Ritter (2007:151) state that with the use of online questionnaires, “the researcher saves on printing, mail, interviewer, and data entry costs”.

In this study, an online questionnaire, an effective method that is replacing the paper based surveying method, was used. Online questionnaires, according to Sue and Ritter (2007:9), “are an effective way to gather information quickly and relatively inexpensively from a large geographic region”. The link to this research questionnaire was electronically sent to students at UR, and the questionnaire was completed without the necessity of physical contact of respondents with the researcher.

As far as their advantages are concerned, online questionnaires allow both the respondents and interviewers mobility, as the questionnaire and the answers can be accessed from anywhere at any time by using not only the computers, but also the mobile technological devices which are the main concern of this research project.

Bradburn, Sudman and Wansink (2004:350) state the following about the technical advantages of online questionnaires:

The major advantages of these procedures are that they allow researchers to design questionnaires with very complex skip

instructions... and to eliminate intermediate steps which speeds up data processing. The computer is programmed not only to present the next question after a response is input but also to determine from the response exactly which question should be asked next; that is, the computer branches automatically to the next question according to the filter instructions [set by the researcher].

As a comparison of different methods used to conduct surveys, Sue and Ritter (2007:7) give the following table that shows that online questionnaire is the most advantageous type with the lowest risk level:

<i>Survey type</i>	<i>Advantages</i>	<i>Disadvantages</i>
Mail	<ul style="list-style-type: none"> • Low cost • Wide geographic reach • No interviewer bias • Anonymity allows sensitive questions 	<ul style="list-style-type: none"> • Low response rate • Lengthy response period • Contingency questions not effective • Don't know who is responding to the survey
Telephone	<ul style="list-style-type: none"> • Limited coverage bias • Speedy responses • Can ask complex questions • Wide geographic reach 	<ul style="list-style-type: none"> • Confusion with sales calls • Intrusive • Call screening • No visual support
Face-to-face interview	<ul style="list-style-type: none"> • Good response rates • Can ask complex questions • Long interviews tolerated 	<ul style="list-style-type: none"> • Limited geographic reach • Time-consuming • Expensive • Interviewer bias • Sensitive topics difficult to explore
Online	<ul style="list-style-type: none"> • Low cost • Fast • Efficient • Contingency questions effective • Direct data entry • Wide geographic reach 	<ul style="list-style-type: none"> • Coverage bias • Reliance on software • Don't know who is responding to the survey

Table 4.1: Comparison of survey methods (Sue and Ritter 2007)

According to Sue and Ritter (2007:7), online questionnaires have three disadvantages as indicated in Table 4.1. As far as the current research project is concerned, those disadvantages were judged not relevant. This study concerns

the students at UR, and all the participants had access to the online questionnaire either on campus by using the university computers and free Internet connection, or elsewhere by using their mobile devices or computers. In addition to these facilities, the research geographic location was Kigali City in Rwanda, the city that is almost entirely covered by a free wireless Internet connection.

All students in both the experimental and the control groups, after signing the research informed consent (see Appendix 10), answered the questionnaire without any need for additional software to access it. As it was a web-based questionnaire, the participants could access it from their preferred browsers on their devices. The questionnaire was activated online at the beginning of October 2014, after a nine-week period of using the mobile devices for language learning purposes for the experimental group.

4.1.3. Online Procedures for the Research Questionnaire

As mentioned in subsection 4.1.2, according to Sue and Ritter (2007:149), “some experts predict that online, particularly web-based, surveys will eventually replace other modes of survey administration”. From their survey, Sue and Ritter (2007:149) found that online questionnaires “are faster, cheaper, and sometimes more effective than other methods”.

Concerning the requirements for online surveys, Sue and Ritter (2007:149) say that online questionnaires are successfully and effectively administered “when dealing with closed populations... and when the target respondents have access to the necessary computer [or mobile device] technology”. As mentioned in subsection 4.1.2, the population and sample of this study fell within this framework. They were composed of the university students who are computer literate, and who have access to the necessary facilities for participating in this research.

4.1.3.1. Choice of Online Tool for the Survey

As discussed in subsection 4.1.1, the questionnaire was prepared and designed as shown in Appendix 1. As an administration method, it was electronically entered on www.freeonlinesurveys.com and www.esurveycreator.com, which both provide online survey facilities, and the comparison between two versions were made in order to choose the more advantageous tool.

The latter, www.esurveycreator.com, was chosen as the most relevant and advantageous tool for this study. In addition to the fact that it provides a free student account, similar to the paid business account, the most advantageous feature of www.esurveycreator.com is that, in addition to the participation with a computer (see Figure 4.3), it is optimized for participation with smartphones and tablets (see Figure 4.1), which are the mobile technological tools of concern in this study. In addition to these features, it also provides a basic data analysis, and allows all its users to download the survey answers as PDF, Microsoft Excel and SPSS files for free (see Figure 4.9), a feature that is available only from the paid version of www.freeonlinesurveys.com.

4.1.3.2. Motivation for the Use of eSurveyCreator

The following are screenshots showing the features and advantages that motivated the choice of www.esurveycreator.com as the preferred tool for this study:

1. It is mobile device friendly. It can be accessed as easily on mobile devices as on computers.

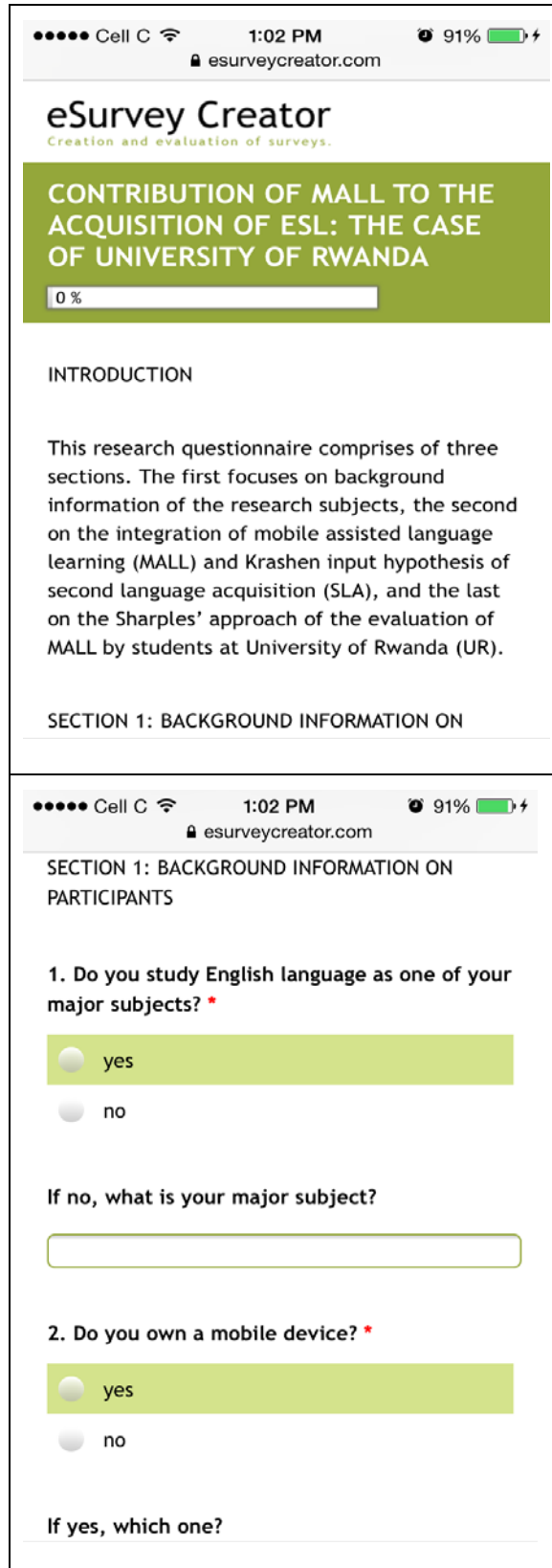


Figure 4.1: The survey view of eSurveyCreator on iPhone (September 1, 2014)

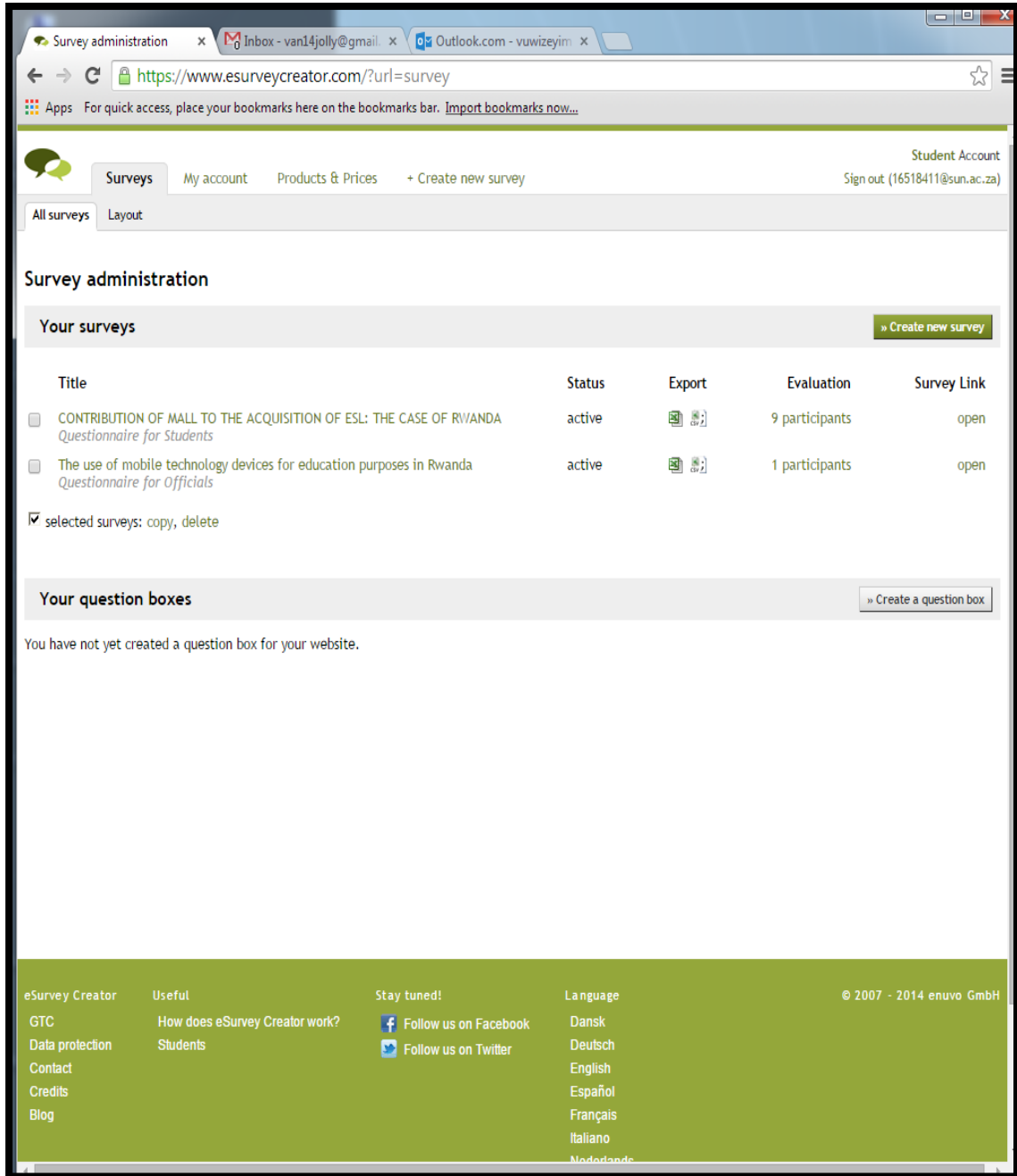


Figure 4.2: The home view of eSurveyCreator on a computer (October 14, 2014)

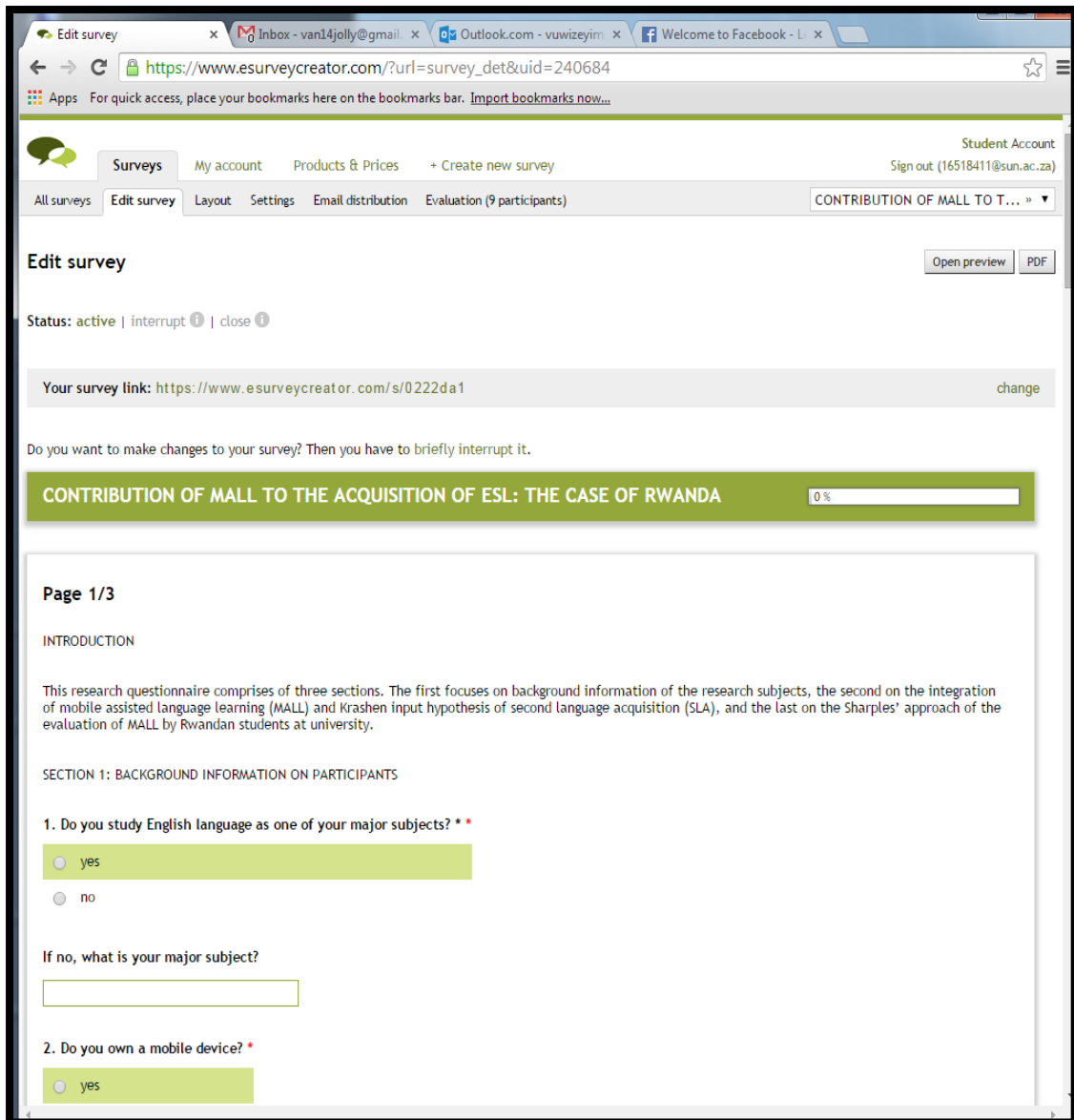


Figure 4.3: The survey view of eSurveyCreator on a computer (October 14, 2014)

2. The free student account, equivalent to the business account of www.esurveycreator.com, is an open-ended account, and provides more functions than the paid account of www.freeonlinesurveys.com.

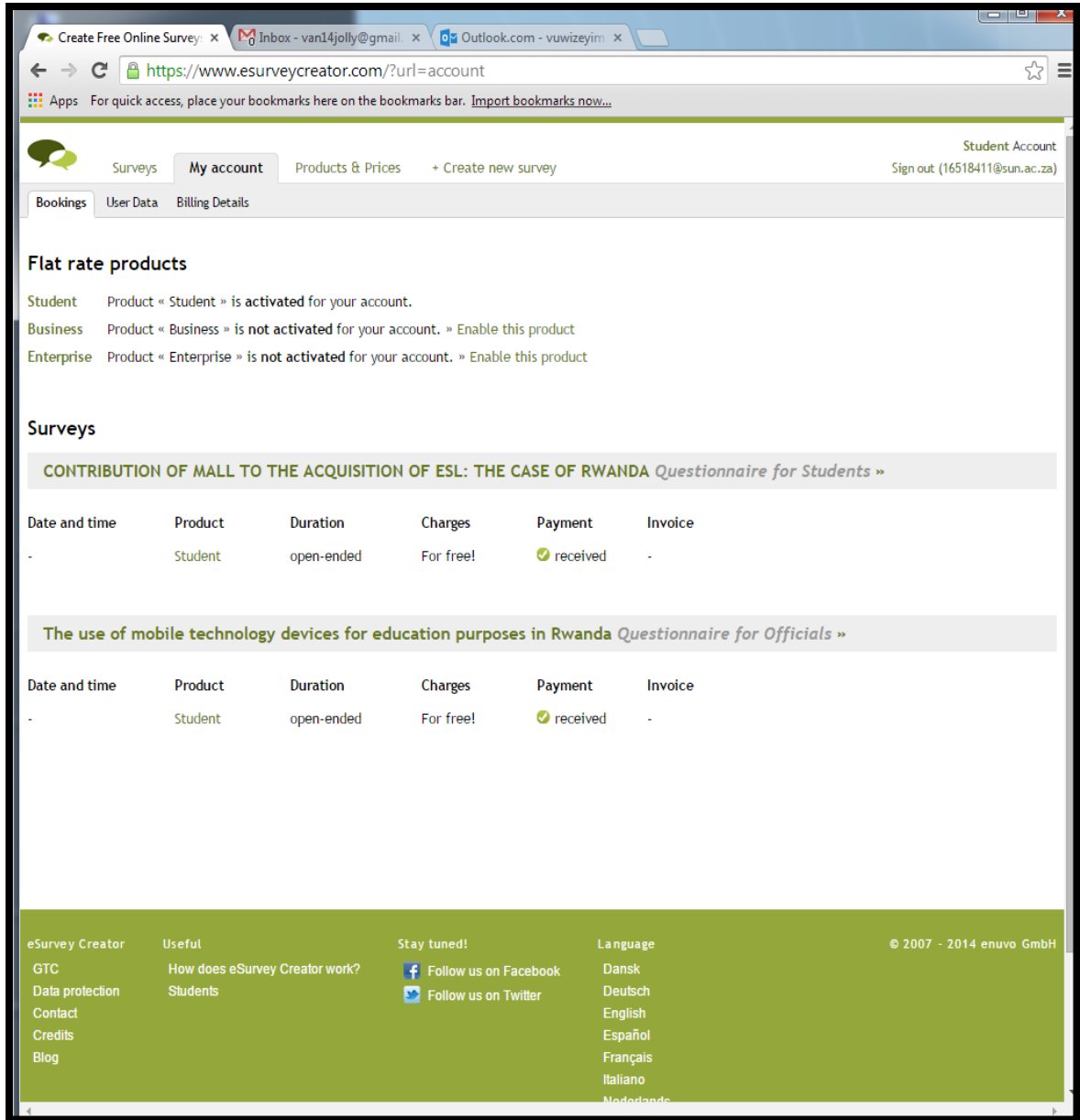


Figure 4.4: eSurveyCreator account view (October 14, 2014)

Products & Prices

Whether you are just trying us out or you plan to launch a comprehensive survey, we have all the right offers at reasonable prices. You can start with a free survey and upgrade to a higher product at any time. It's always up to you whether you want to extend a survey or not - there's no automatic renewal and you don't have to cancel subscriptions whatsoever. It's all transparent: No obligations and no hidden costs.

	Products for single surveys			Flat rate products		
Products	Basic	Personal	Pro	Business	Enterprise	Student
	For simple and small surveys or just to try us out.	For professional surveys with short to medium term.	For professional surveys with a long duration and/or large return.	The flat rate offer for companies who want to conduct any number of surveys and be unrestricted in use.	This is our unlimited high-end solution for usage without any reference to eSurvey Creator (white label).	Benefit from a free flat rate product!
<i>Main differences to previous product</i>		+ Custom layout + Add images + Ad-free	+ Annual survey + Unlimited number of responses	+ Any number of surveys + Multiple accounts included	+ White label solution + Your own domain + We create your questionnaire design	Corresponds to the product "Business" (with a few restrictions)
Duration	1 month ⓘ	1 month ▼ ⓘ	1 year ▼ ⓘ	1 year ▼ ⓘ	1 year ▼ ⓘ	This offer is available as long as your student email address is valid.
	choose »	choose »	choose »	choose »	choose »	Check my student email address for admission »
Price ⓘ	For free!	USD 19.00 monthly, per survey	USD 169.00 annually, per survey	USD 279.00 annually, for any number of surveys	USD 599.00 annually, for any number of surveys	For free!
Number of user accounts ⓘ	1	1	1	5	10	1
Number of questions	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited
Number of participants	limited ⓘ	limited ⓘ	unlimited	unlimited	unlimited	unlimited
Number of answers *	max. 350 ** ⓘ	5,000 per month *** ⓘ	unlimited	unlimited	unlimited	unlimited
Free support	✓	✓	✓	✓	✓	✓
No contract obligations, no automatic renewal	✓	✓	✓	✓	✓	✓

Figure 4.5: Comparison of eSurveyCreator products and prices (October 14, 2014)

- While respecting anonymous participation in a survey, eSurveyCreator provides the possibility for e-mail distribution of the questionnaire with personalized links. This function allows the participant to pause and resume the survey, and simultaneously limits multiple participations by one individual. This function also allows the researcher to send reminders to the research participants to participate in the survey.

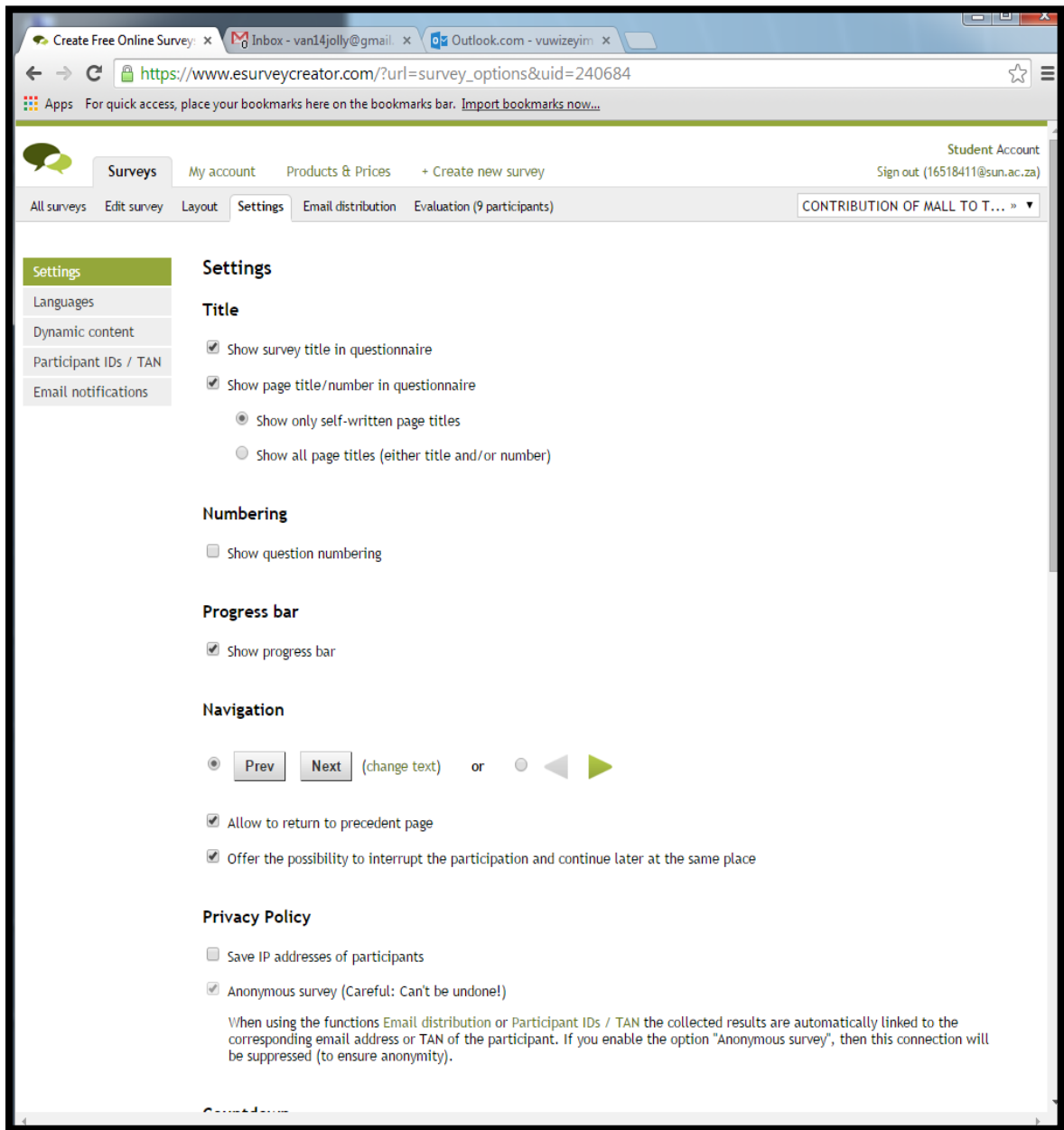


Figure 4.6: The survey settings on eSurveyCreator (October 14, 2014)

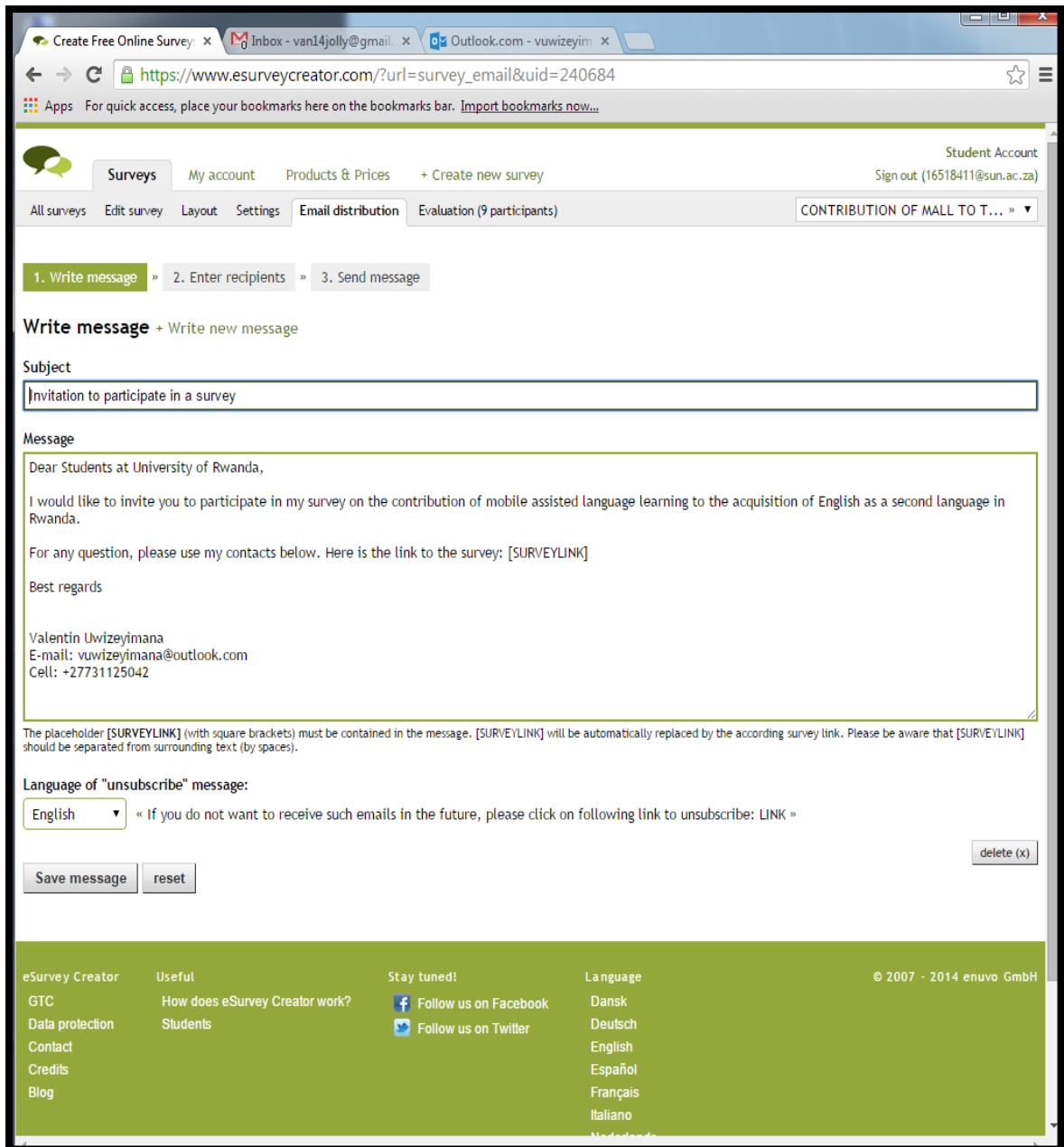


Figure 4.7: Writing a message to participants in eSurveyCreator (October 14, 2014)

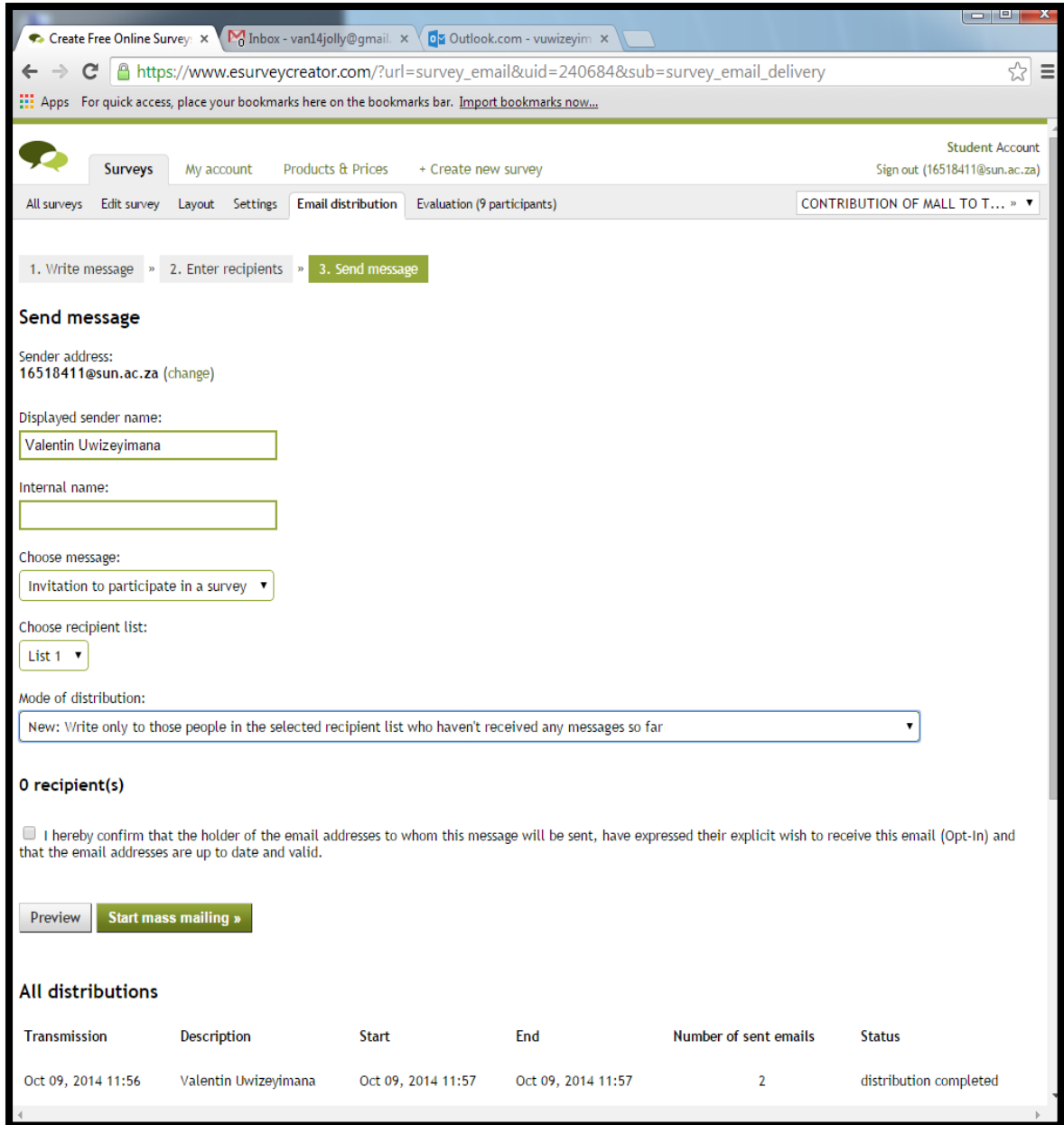


Figure 4.8: Mass mailing in eSurveyCreator (October 14, 2014)

- eSurveyCreator saves research time by simplifying the data entry process, in that it provides basic data analysis, and allows researchers to download the surveys in SPSS, Microsoft Excel and PDF formats for further processing.

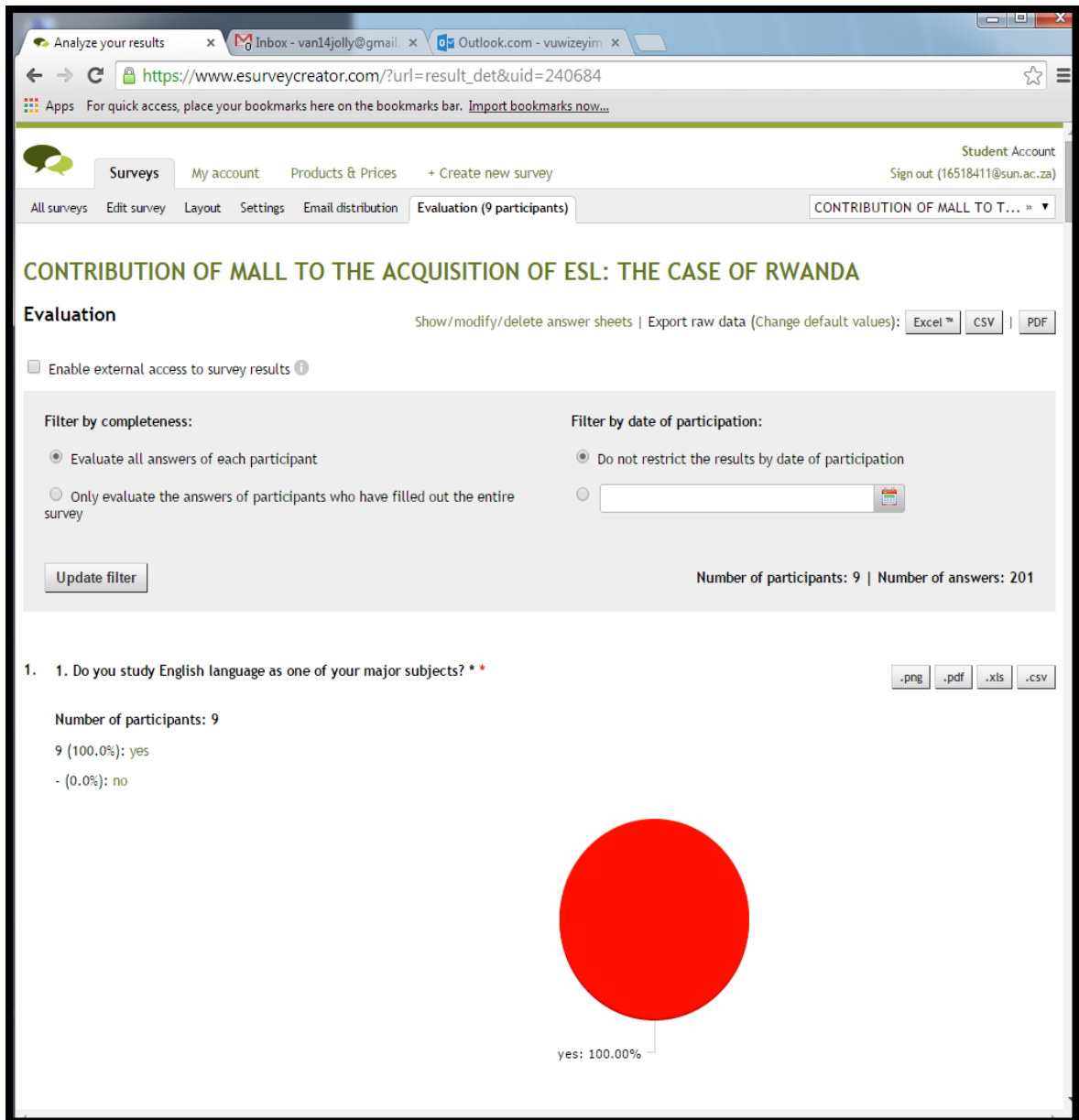


Figure 4.9: Survey view in evaluation mode on eSurveyCreator (October 14, 2014)

4.2. Evaluation Test

It is not usually possible to investigate various and different variables by using only one tool. Sometimes it is necessary to study one variable by using one tool, and at the same time testing or verifying the findings by using another tool. It is in this regard that, as mentioned in section 3.1, an evaluation test was used to collect data in addition to other tools that were used, namely a questionnaire, observation and interviews. This section focuses on the test that was

administered, by providing details about the instructions for the test, the introduction to the test, as well as the readability score calculation methods that were used to measure the text used for this test.

4.2.1. Instructions for the Test

The test for this study was not related in any way to the academic program of UR, and the students' results in the test did not affect in any manner the results in their studies at UR or at any other institution. This test was only in the framework of this research project, located in the area of technology for language learning, and focusing on the contribution of mobile devices on students' academic performance at UR. It was administered once to both the experimental and control group, and the students' anonymity and confidentiality was respected in the process of interpretation of the results. The researcher kept the results from this test, and the latter were only used for research purposes by the principal researcher in this project.

4.2.2. Introduction to the Test

The test for this research was composed of three sections. The first section comprised of gap questions, and aimed at evaluating how the students can perform in their exams depending on their knowledge of, or ability to understand, enough academic vocabulary i.e. language input. For this section, as mentioned in Appendix 2, the text of Yule (1996:151-153), which is one of the prescribed texts for undergraduate students doing English language at UR, was selected as a relevant text to be used to evaluate the performance of the research participants.

The second and the third sections of the test focused on listening comprehension, and they were related to the students' skills in, and knowledge of accessing and using, digital English language resources by using their mobile technological devices. In using the audio materials, these two sections considered the development of students' listening and speaking skills. The

language resources that were used are available from the website of British Council's initiative called 'Learn English Professionals', at <http://www.britishcouncil.org/learnenglish>, and they were available to be directly streamed from the SUNLearn page that was used to administer the test (see section 4.2.6).

4.2.3. Text Readability Level

Harrison (1980:14) defines readability as "the constellation of text factors which together determine whether a reader will be likely to find a book [or a text] attractive, interesting and comprehensible". In this framework, to ensure that the text is relevant to the students at UR, the readability level, with the focus on the student's level of education and the text comprehensibility score, was calculated.

There are different formulas used to calculate the text readability level, and according to Klare (1963:21), "a writer, editor, or research worker who wants to use a formula must choose from among about 31 and their variations". Concerning the choice for the right formula to use, Klare (1963:23) says that "the most popular formula [is] the Flesch reading ease formula".

According to Harrison (1980:77), "the Flesch formula is one of the best-known readability measures". With reference to these views, the Flesch formula was chosen from other formulas because it is the most relevant to adult and university student reading materials.

Harrison (1980:77) focuses on the Flesch formula relevance to "adult reading material" by stating the following:

Since Flesch was primarily interested in assessing adult reading material, he chose a difficulty index which did not relate to grades, but to a notional comprehension score out of 100. Thus a difficult passage would yield a score of below 50, while a single child's book would approach a score of 100.

To calculate the readability score for the text by Yule (1996:151-153) used for the gapping section of the evaluation test (Appendix 2), Microsoft Word software and different online readability calculators were used, and all of them provided the same results. Two online free calculators, respectively accessible from www.read-able.com and www.readability-score.com were used to verify the score provided by Microsoft Word.

All the tools showed that the readability score for the text is 44, and that the grade score is 11.5. According to Flesch quick chart index presented in Table 4.2, this text is fairly difficulty, and relevant to the readers who completed high school. This study was conducted on students who were doing undergraduate studies at UR, and who are not native speakers of English. Therefore, the readability level of this text can be considered as one level more difficult for them than the one mentioned in Table 4.2. However difficult the text could be for the research participants, it was selected as a text to be used because it requires that the participants understand new content words, i.e. the input which is a little beyond their current language ability.

4.2.4. Focus on Flesch Formula

This subsection focuses on Flesch formula for calculating the text readability, the formula that was used to calculate the readability of the text used for evaluating the research participants. As it is illustrated on the “quick reference chart” (Flesch 1951:220) presented on Table 4.2, Flesch formula calculates the text difficulty score in figures ranging from 0 to 7, as well as the reading ease score, which is calculated out of 100, and which shows the text potential audience.

Flesch (1951:75) explains as follows how this formula calculates the text difficulty score:

First, take the average length of the sentences and multiply it by 0.1338. Then, take the number of affixes per 100 words and multiply it by 0.0645. Add these two figures. Next, multiply the number of personal references in 100 words by 0.0659 and subtract the result

from the sum of the first two figures. Finally, subtract 0.75. The result is your difficulty score, which is apt to be a figure between 0 and 7.

In addition to calculating the difficulty score, the Flesch reading ease formula was used to calculate reading ease score, i.e. how UR students are likely to read the text. According to Flesch (1948:229), “the reading ease score will put your piece of writing on a scale between 0 (practically unreadable) and 100 (easy for any literate person)”. Below is how Flesch (1948:229) and Klare (1963:58) explain how Flesch formula calculates the percentage of the text potential audience, alternatively referred to as ‘readability score’ or ‘reading ease score’:

Systematically select 100-word samples from the material to be rated; determine the number of syllables per 100 words, [i.e. word length] (WL); determine the average number of words per sentence, [i.e. sentence length] (SL); apply in the following reading ease equation: $R.E. = 206.835 - 846WL - 1.015SL$

Regarding word sampling that is the first step for using Flesch ease score formula, Klare (1963:101) states that “sampling is not necessary in the use of readability formulas, since they can be applied to an entire piece of writing... The function of sampling is to save time and money”. For this study, the use of modern technologies and Internet simplified the process. The whole piece of text provided by Yule (1996:151-153) was typed as a Microsoft Word document, then analysed by both Microsoft Word and the online tools, namely www.readable.com and www.readability-score.com, which gave the same results. All the tools confirmed that the readability or reading ease score for the text is 44%, and that the difficulty score is 4.4. These indexes mean that the text is “fairly difficulty” (Flesch 1951:220), and relevant to the audience made of people holding at least some high school qualification, or grade 11.5 students as the calculation tools showed (see Table 4.2 for details).

<i>Description of style</i>	<i>Difficulty score</i>	<i>Words in average sentence</i>	<i>Affixes per 100 words</i>	<i>Personal references per 100 words</i>	<i>Typical magazine</i>	<i>Potential audience (School grades completed)</i>	
Very easy	Up to 1	8 or less	22 or less	19 or more	Comics	4 th grade	90%
Easy	1 to 2	11	26	14	Pulp-fiction	5 th grade	86%
Fairly easy	2 to 3	14	31	10	Slick-fiction	6 th grade	80%
Standard	3 to 4	17	37	6	Digests	7 th or 8 th grade	75%
Fairly difficult	4 to 5	21	42	4	Quality	Some high school	40%
Difficult	5 to 6	25	46	3	Academic	High school or some college	24%
Very difficult	6 and up	29 or more	54 or more	2 or less	Scientific	College	4.5%

Table 4.2: Difficulty score quick reference chart (adapted from Flesch 1951:220)

4.2.5. Can we rely on the Formulas to Measure Readability?

According to Davison and Kantor (1982:190), “there is empirical evidence that readability formulas do measure factors, length and complexity of vocabulary, that may reflect readability, but is clear that the formulas do not point to all the features of a text that actually contribute to readability or comprehensibility”.

To answer the question posed within the title of this subsection, Davison and Kantor (1982:190) argue that relying the formulas to measure the readability of “a text may do more harm than good”. And Davison and Kantor (1982:208) “urge

writers to rely on their own judgments about language which is appropriate for the intended reader, and not on stereotyped notions, or readability formulas”.

With the consideration of these arguments, but without ignoring the importance of the readability calculation formulas, the choice of the text was done. The text used within the test for the students at UR was picked from one of the prescribed student reading books at UR. In the framework of Davison and Kantor (1982), the text of Yule (1996) as provided in Appendix 2, was judged not only as relevant and appropriate to the research participants, but also as a text which can help the participants to acquire or to understand some concepts of technology for language learning while developing their reading and writing skills.

In order to assess how the research participants can develop their English listening and speaking skills by using their mobile devices, in addition to considering the written text as part of the test, audio clips were used in the context of Abdous, Camarena and Facer (2009:77), according to whom, as mentioned in section 2.3, the use of audio clips including podcasts as teaching, learning and assessment tools can “enable students... to expand their vocabulary, and to build [their] oral and aural skills”.

4.2.6. Administration

Similarly to the questionnaire, as discussed in section 4.1, especially in subsection 4.1.3, the test was administered online for both the experimental and control groups, and it was activated during the three week period from October 27 to November 16, 2014.

The test was prepared and entered as ‘University of Rwanda: Mobile Use’ into SUNLearn (see Figure 4.10 and Figure 4.11), which is the Stellenbosch University Moodle-based learning platform accessible from <http://www0.sun.ac.za/elearn>. SUNLearn is mobile device friendly, and an easy-to-use web-based testing tool that allows a variety of question types that can incorporate multimedia files (see Figure 4.12). All the research participants in Rwanda were requested to complete the test by using any type of technological device of their own or the

university computers. The computer technician at the College of Education of UR, located in Kigali, provided to the research participants the technical assistance necessary to use SUNLearn.

The following are some screenshots of the research module page on SUNLearn:

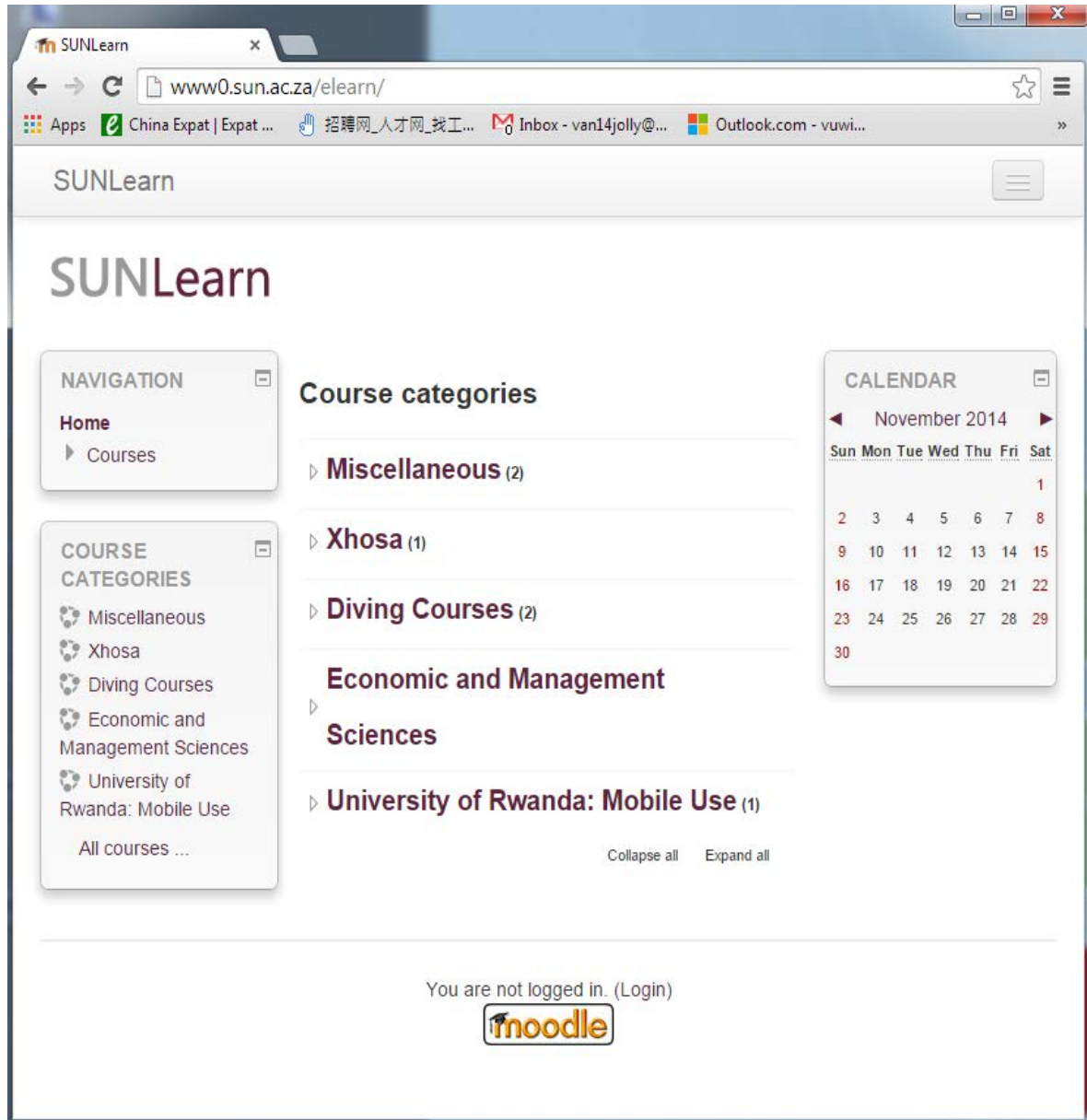


Figure 4.10: SUNLearn home screen (November 11, 2014)

The screenshot shows a web browser window with the URL `www0.sun.ac.za/elearn/mod/quiz/attempt.php?attempt=16`. The page title is "The Study of Language". The user is logged in as "Valentin Uwizeyimana".

QUIZ NAVIGATION

- 1
- Finish attempt ...
- Start a new preview

Question 1

Not yet answered
Marked out of 15.00
Flag question

Fill the gaps in this extract from Yule (1996) by using the following words/phrases. You can copy/paste into the gaps if your spelling is a bit suspect.

artificial intelligence	syntactic rules	pattern-matching systems
conversational partner	artificial language	dictation systems
speech recognition	modeling of intelligence	acoustic properties
language production	speech synthesis	vocal tract
articulation	mental processes	navigators

LANGUAGE AND MACHINES

In 1738, Jacques de Vaucanson produced a fabulous mechanical duck. It could perform the amazing feat of drinking water and eating grain which was digested and then excreted via a mysterious chemical process and some complex tubing in its stomach. This mechanical marvel is simply one example in a long line of machines which humans have created in imitation of living organisms. The interesting thing about Vaucanson's machine is that it simulated digestion without actually containing a replica of the digestive system. It can be seen as an exercise in working with available technology to create a model of some internal processes of a duck. Note that it is a model, not a replication. This is an important point, since the aim of many such exercises is not to mimic the details of an internal process, but to have the output of the model be indistinguishable from the output of the real thing. By all accounts, the duck's output passed as genuine.

However, the kind of output which we are more interested in is the result of natural language processing by a machine, or, more specifically, a computer. It is necessary to specify that it is a natural language (e.g. English) rather than an (e.g. BASIC), since it is the human capacity to use language that is being modeled.

SPEECH SYNTHESIS AND RECOGNITION

One of the first aspects of natural language to be modeled was the actual of speech sounds. Early models of talking machines were essentially devices that mechanically simulated the operation of the human . More modern attempts to create speech electronically are generally described as , and the resulting output is called synthetic speech. From one point of view, it seems remarkably simple. Take the set of phonemes of English, electronically reproduce the acoustic properties of these sounds, then select those phonemes which make up the pronunciation of a word and play the word. While this is not as easy as the brief description suggests, synthetic speech has indeed been produced in this way. It sounds terrible. More tolerable facsimiles of speech have been produced by having

Figure 4.11: Evaluation text preview on SUNLearn (November 11, 2014)

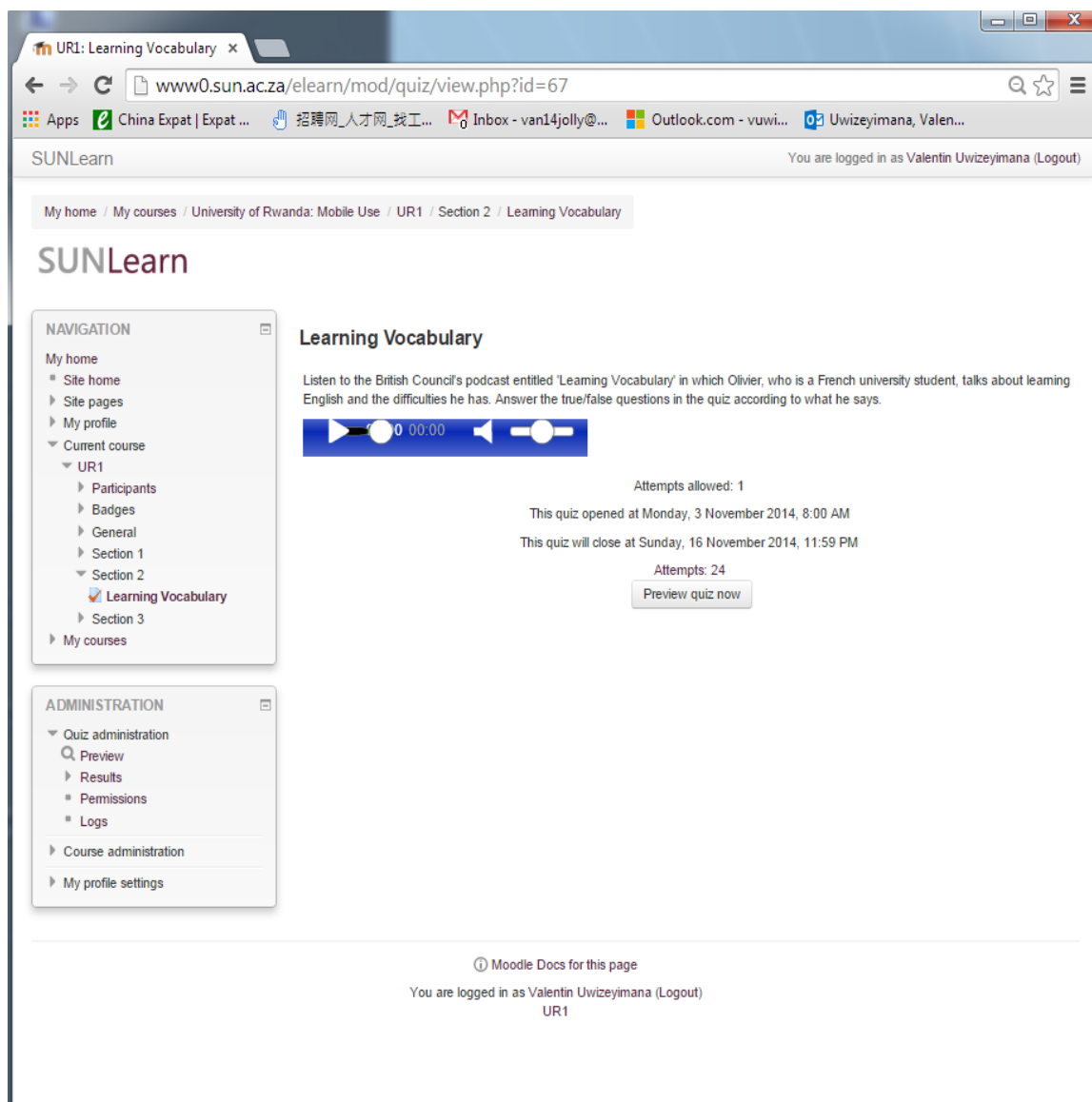


Figure 4.12: The use of multimedia files in SUNLearn (November 11, 2014)

4.3. Observation and Informal Interviews

As argued by Bradburn, Sudman and Wansink (2004), interviews are important not only for data elicitation and collection, but also as a way of motivating respondents. Bradburn, Sudman and Wansink (2004:8) state the following:

The opportunity to meet and talk with a variety of people appears to be a key attraction for many professional interviewers. By the same token, a key attraction for many respondents appears to be the

opportunity to talk about a number of topics with a sympathetic listener.

According to Bingham and Moore (1950), quoted in Bradburn, Sudman and Wansink (2004:8), a research interview is “a conversation with a purpose”. It is in this framework that, in addition to the structured questionnaire, discussed in section 4.1 and included as Appendix 1, as well as the test for the research participants, discussed in section 4.2 and presented in Appendix 2, unstructured interviews with and observations of the research participants, especially the ones composing the experimental group of this study (see section 3.2.1), and unstructured interviews with different officials at UR and MINEDUC were conducted. In addition to the research questionnaire and evaluation test, various observations and informal interviews were used as tools to facilitate and simplify the data collection process by motivating the research participants, the university members, and the local governance authorities to participate in and provide assistance required for the success of this research. Interviews and observation were not used as data collection tools, and the data collected from them were neither presented nor analysed.

Chapter 5: DATA PRESENTATION AND ANALYSIS

According to Thomas (2011:1):

[In] some classrooms today, ... instructors have made great efforts to integrate digital technologies in order to enhance learners' access to information and collaborative activities. In others, the start of the class can be compared to boarding an airplane: learners are expected to sit down and immediately switch off all of their electronic devices.

This research investigated the use of electronic mobile devices for English as a second language (ESL) learning purposes by university students in a developing country. This chapter presents and discusses the findings of this investigation that emphasised how the use of mobile electronic devices can contribute to the students' success by helping them to process the ESL input. This study is geographically located in Rwanda and, as mentioned in section 3.2, it focused on university students studying English as one of their major subjects at University of Rwanda (UR), a country in which, as discussed in section 2.4, especially in subsection 2.4.2.2, English is used as a second language and as the language of instruction at all levels of education.

The research data collected from the survey as discussed in section 4.1, and from the test as discussed in section 4.2, were entered into and analysed by using SPSS and STATISTICA data mining software, and the findings are discussed in two main parts, namely the findings from the survey and the findings from the test.

The results from the conducted survey were generated by using SPSS as one of the relevant data mining software, and as mentioned in section 4.1, the related findings are grouped into three sections including the background information on the research participants (see section 5.1), mobile-assisted language learning (MALL) and optimal ESL input (see section 5.2), as well as the Sharples' approach in the context of UR (see section 5.3). In order to verify statistically the extent to which the findings from the survey might be valid or not (see section 5.4), an experimental group and a control group were used, and an ESL evaluation test was administered (see section 4.2) to both groups.

5.1. Background Information on the Research Participants

As mentioned in section 3.2, this research investigated the contribution of MALL with regard to the successful acquisition of ESL in Rwanda on the basis on 24 students doing undergraduate studies at UR as the research sample. This section provides the detailed information on the background of these 24 students. The data is grouped into 4 variables as shown on Table 5.1, and was collected by the questions posed within the first section of the research questionnaire (see Appendix 1). All the members of both the experimental and control groups (see sections 3.2.1 and 3.2.2) were asked to respond to these questions.

<i>Variable</i>	<i>Question</i>
i. ESL learning at university	Do you study English language as one of your major subjects? If no, what is your major subject?
ii. Access to mobile technologies	Do you own a mobile device? If yes, which one?
iii. The use of mobile technologies	Do you use your mobile device for specific purposes? If yes, which are they?
iv. Use of mobile technologies for ESL learning purposes	Do you use your mobile device for English language learning purpose? If yes, how do you use it?

Table 5.1: Background information on the research participants

5.1.1. Participants' Field of Study

This research was conducted on the contribution of mobile technologies to the successful acquisition of English as a second language (ESL). As shown on Table 5.1, the first variable investigated in this study was ESL learning at university. As it was one of the conditions for being selected as this research sample (see section 3.2), and as illustrated in Table 5.2, all the research participants

answered 'Yes' to the question aimed to ascertain whether the participants were studying English language as one of their major subjects at the College of Education of UR, at Kigali.

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	24	100.0	100.0	100.0

Table 5.2: ESL learning at university

5.1.2. Access to Mobile Technologies

This study used the purposive sampling strategy in order to select the experimental group (see section 3.2). In order to be selected as a member of the experimental group, in addition to being a student of the English language at university level, one had to have access to mobile technologies. In this regard, as illustrated in Table 5.1, the second question to the research participants was formulated.

As mentioned above, the second variable studied within this research was access to mobile technologies, the variable that was investigated by asking the participants if they owned mobile devices. And 22 of the 24 participants (91.7%) who participated in this research, and specifically, who include all 13 members of the experimental group and 9 members of the control group, owned at least one mobile technological device (see Table 5.3).

	Frequency	Percent	Valid Percent	Cumulative Percent
No	2	8.3	8.3	8.3
Yes	22	91.7	91.7	100.0
Total	24	100.0	100.0	

Table 5.3: Access to mobile technologies

Among the types of mobile technologies that the research participants had access to, as illustrated in Table 5.4, were mobile phones owned by all 22 participants (see Table 5.3 and Table 5.4), MP3 players, laptops, and tablets.

	Frequency	Percent	Valid Percent	Cumulative Percent
No mobile device	2	8.3	8.3	8.3
Mobile phone	11	45.8	45.8	54.2
Mobile phone and laptop	4	16.7	16.7	70.8
Mobile phone and MP3 player	1	4.2	4.2	75.0
Mobile phone and tablet	4	16.7	16.7	91.7
Mobile phone, tablet and laptop	2	8.3	8.3	100.0
Total	24	100.0	100.0	

Table 5.4: Types of mobile devices

As illustrated in Table 5.4, all 22 participants who mentioned that they owned the mobile devices possess mobile phones. In addition to mobile phones, 4 participants (16.7%) owned laptops, 1 (4.2%) owned an MP3 player, 4 (16.7%) owned tablets, and 2 participants (8.3%) owned both tablets and laptops.

5.1.3. The Use of Mobile Technologies for Specific Purposes

After investigating whether the research participants have access to mobile technologies (see section 5.1.2), the way these technologies are used was studied. Among the 24 research participants, 5 (20.8%) said that they do not use their mobile devices for specific purposes, whereas 19 (79.2%) said that they do.

Concerning the purposes for which the mobile devices are used, communication was common among all those 19 research participants. As illustrated in Table 5.5, the combination of purposes for the participants include:

- Communication
- Communication and entertainment
- Communication and studies
- Communication, entertainment and studies
- Communication, entertainment, work and studies
- Communication, work and studies

	Frequency	Percent	Valid Percent	Cumulative Percent
No specific purpose	5	20.8	20.8	20.8
Communication	2	8.3	8.3	29.2
Communication and entertainment	3	12.5	12.5	41.7
Communication and studies	5	20.8	20.8	62.5
Communication, entertainment and studies	4	16.7	16.7	79.2
Communication, entertainment, work and studies	2	8.3	8.3	87.5
Communication, work and studies	3	12.5	12.5	100.0
Total	24	100.0	100.0	

Table 5.5: Purposes for which mobile devices are used

5.1.4. Use of Mobile Devices for ESL Learning Purposes

After finding that some of the research participants at UR use their mobile devices for study related purposes, learning of English as a second language (ESL) was investigated. In this regard, all the participants were asked whether they use their mobile devices for ESL learning purposes (see Table 5.1 in section 5.1 and Appendix 1). Among 24 research participants, 10 (41.7%) answered that they do not use mobile devices for ESL learning purposes, and the remaining 14 (58.3%) inclusive of the 13 in the experimental group (see section 3.2.1) said that they do.

To determine the use of mobile technologies in the ESL learning process (see Table 5.1), all the participants were asked to specify how they use their devices in learning, and the findings include the use of mobile devices as dictionaries, translators, as well as sources of information (see Table 5.6 for details).

	Frequency	Percent	Valid Percent	Cumulative Percent
No use of mobile devices for ESL learning	10	41.7	41.7	41.7
Dictionary	3	12.5	12.5	54.2
Dictionary and translator	2	8.3	8.3	62.5
Dictionary, translator and English language applications	1	4.2	4.2	66.7
Dictionary, translator and English language websites	1	4.2	4.2	70.8
Dictionary, translator, search engines and English language applications	1	4.2	4.2	75.0
Dictionary, translator, search engines and English language websites	5	20.8	20.8	95.8
Dictionary, translator, search engines, English language websites and applications, and typing my assignments	1	4.2	4.2	100.0
Total	24	100.0	100.0	

Table 5.6: The way mobile technologies are used in ESL learning

As presented in Table 5.6, except for 41.7% who said that they do not use the mobile technologies for ESL learning, the research participants primarily use their devices as electronic dictionaries to help them understand the ESL input. Among the 58.3% who use their devices for ESL learning, Table 5.6 illustrates that 3 participants (12.5%) use their devices as dictionaries only, whereas the remaining participants use their devices as different tools that include dictionaries, translators, search engines, and other applications (see sections 3.4.1 and 3.4.2).

5.2. MALL and Optimal ESL Input

As mentioned in section 3.1.1, there are six requirements for optimal language input. According to Krashen (1982:163-169), the input must be a tool for conversational management, comprehensible, interesting and relevant, not grammatically sequenced, quantitatively enough, and must facilitate a high level of the affective filter.

In the context of the input hypothesis, Table 5.7 illustrates the six variables that were investigated, as well as the questions that were used to study the case of ESL learning in Rwanda:

<i>Variable</i>	<i>Question</i>
i. Input comprehensibility	Does using a mobile device help you to learn and understand the meaning of new English words which are necessary for understanding the input received from your classroom?
ii. Interesting and relevant input	Does using a mobile device help you to learn the new words you need for the success in your activities, and the new words that are relevant to the context? If yes, in which activities and context?
iii. Input grammatical sequence	Does the content you get by using your mobile device help you to understand English grammatical rules? If no, with what does it help you? It can help you to improve communication skills for example.
iv. Input quantity	Does using your mobile device expose you to rich comprehensible English language learning resources? If yes, what are those resources?
v. Filter strength	Does using your mobile device help you to improve your communication skills in the English language? If yes, how?
vi. Conversational management	Does using your mobile device help you to interact with English language speakers, and improve your communication skills in English as a second language (ESL)? If yes, how?

Table 5.7: MALL and optimal ESL input

5.2.1. Input Comprehensibility

With the focus on both form and meaning, according to Krashen (1982:138), “the entire goal of [language] classroom practice [should be]... to provide comprehensible input”. It is in this context that with the integration of mobile technologies into SLA, as mentioned in Table 5.7, all the research participants were asked whether using mobile device could help them to learn and understand the meaning of new English words which are necessary for understanding the input received from their classrooms, and their answers are presented in the following table:

	Frequency	Percent	Valid Percent	Cumulative Percent
No	5	20.8	20.8	20.8
Yes	19	79.2	79.2	100.0
Total	24	100.0	100.0	

Table 5.8: ESL input comprehensibility

As presented in Table 5.8, 5 participants (20.8%) answered that their mobile devices do not help them to understand the meaning of new words, whereas the remaining 79.2% said that their devices help them to make English language input comprehensible. The research finding shows that mobile devices are potential tools to provide comprehensible input to the L2 learners.

5.2.2. Interesting and Relevant Input

As far as interesting and relevant input in SLA is concerned, Krashen (1982:128) states the following:

There is usually an attempt, especially in recent years, to provide topics of interest in the reading selection, but the usual topics fall short of the forgetting principle. They clearly do not seize the students' attention to such an extent that they forget that it is written in another language.

Language input cannot be relevant when the learning context and the learners' activities are not considered all along the learning process. As far as the ESL input in Rwanda is concerned, as mentioned in Appendix 1 and in Table 5.7, all the participants were asked whether using their mobile devices could help them to learn new English words needed for the success of their studies, and relevant to their context.

A total of 17 participants (70.8%) positively answered that their mobile devices expose them to interesting and relevant ESL input, whereas the remaining 7 participants (29.2%) negatively responded to the question. After finding that mobile devices can expose users to interesting and relevant ESL input, the activities in which the exposure takes place for university students in Rwanda were compiled in the following table:

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	7	29.2	29.2	29.2
Communication	2	8.3	8.3	37.5
Studies	10	41.7	41.7	79.2
Studies and communication	2	8.3	8.3	87.5
Studies and work	3	12.5	12.5	100.0
Total	24	100.0	100.0	

Table 5.9: Activities in which ESL input is interesting and relevant

As can be seen in Table 5.9, the primary activity in which mobile ESL input is seen as both interesting and relevant is studies. Among the 17 research participants, 10 (41.7%) said that the mobile device ESL input is interesting and relevant to their studies only, while 2 participants (8.3%) answered that the input is relevant to communication. The remaining 5 participants mentioned that mobile ESL input is interesting and relevant to all the activities related to their studies, in addition to their communication or their work.

5.2.3. Input Grammatical Sequence

As discussed in section 3.1.1 of this thesis, according to Krashen (1982:127), L2 input should not be “grammatically sequenced”. In the same context, Krashen (1982:138) states that “the focus of the class is not on the presentation of grammar; there is a tendency for certain structures to be used more often in certain stages, but there is no deliberate sequencing”.

As far as MALL is concerned, the use of mobile technological devices is personal (see sections 2.1.2.4 and 2.1.2.6), and there is no predetermined sequence within input that the users can receive from them. But in order to contribute to the successful acquisition of an L2, the acquisition of grammar has to take place through free and personalized use of mobile devices. In other words, the focus is on the sequence of received input that facilitates the acquisition of the L2 grammar, not on the sequence of grammatical rules.

To examine the usefulness of mobile devices as support to recognise grammatical sequencing in ESL input, research participants were asked whether the content they get by using their mobile devices could help them to understand grammatical rules of English. The analysis of the answers to this question showed that for 14 participants (58.3%), the use of mobile devices could contribute to the understanding of grammatical sequence, whereas for the remaining 10 participants (41.7%), mobile devices did not contribute to their understanding of English grammatical rules, may be due to the fact that they were not members of the experimental group, and therefore they were not trained on the use of mobile technologies for language learning purposes (see sections 3.2.1 and 3.2.2).

In addition to enhancing students’ understanding of grammatical sequence, some participants answered that the use of mobile devices could also improve their English communication skills, and contribute to their acquisition of new lexical items in English.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	17	70.8	70.8	70.8
Communication skills	6	25.0	25.0	95.8
New vocabularies	1	4.2	4.2	100.0
Total	24	100.0	100.0	

Table 5.10: Other contributions of mobile technologies

As illustrated in Table 5.10, 6 participants (25%) said that the use of mobile devices positively contributes to their English communication skills, and one participant (4.2%) mentioned that mobile technologies contribute to the successful learning of new words in English.

5.2.4. Input Quantity

In the context of Krashen's input hypothesis as discussed in section 2.2.1, according to which successful SLA occurs once the learners receive enough comprehensible input, this study investigated whether the use of mobile devices can expose the university students in Rwanda to rich and comprehensible English language learning resources.

This study found that for the majority of the university students in Rwanda, mobile devices are useful tools that help them to obtain sufficient and relevant ESL input quantity. Of the 24 participants, 13 (54.2%) said that their mobile devices expose them to rich and comprehensible English language input, whereas the remaining 11 (45.8%) said that their devices do not expose them the relevant English language input.

As discussed in section 5.1.4, most of the research participants, especially members of the experimental group (see section 3.2.1), used their mobile devices for language learning purposes, at least during the data collection period. After verifying that the majority of participants link the use of mobile devices to ESL rich and comprehensible input, details about the way mobile devices expose the

users to that input were requested, and the answers are presented in the following table:

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	11	45.8	45.8	45.8
Dictionary and English language websites	2	8.3	8.3	54.2
Dictionary, search engines, and English language websites	1	4.2	4.2	58.3
Dictionary, translator, and English language websites	4	16.7	16.7	75.0
Dictionary, translator, eBook reader, and English language websites	1	4.2	4.2	79.2
Dictionary, translator, eBook reader, search engines, and English language websites	1	4.2	4.2	83.3
Dictionary, translator, search engines, and English language websites	3	12.5	12.5	95.8
English language websites	1	4.2	4.2	100.0
Total	24	100.0	100.0	

Table 5.11: Mobile technologies and ESL learning resources

As illustrated in Table 5.11, of the 13 participants who provided details about the manner in which their mobile devices expose them to a rich and comprehensible input of English as a second language (ESL) in Rwanda, the common source of input was found to be a dictionary on a mobile device. The research findings presented in Table 5.11 and Table 5.6 confirm that mobile devices provide easy access to online and offline English language resources (see sections 3.4.1 and 3.4.2) such as dictionaries, translators, websites, and other applications that expose the users to rich and comprehensible input.

5.2.5. Filter Strength

According to Krashen (1982:127), L2 input must be “off the defensive”, i.e. must allow the students to acquire other items and to improve their skills as far as language practice is concerned. Therefore, L2 input should help learners to improve their L2 skills, to improve their communication skills in that L2, and therefore enable them to produce freely the necessary L2 structures without anxiety.

To investigate the filter level in the context of MALL, all the participants were asked if using their mobile technological devices could help them to improve their communication skills in English as a second language (ESL) in Rwanda (see Table 5.7 and the questionnaire on Appendix 1), and therefore to be able to learn and acquire new subjects, and to feel comfortable with interacting in English language. The majority of the research participants, 18 (75%), answered that their mobile devices help them to improve their ESL communication skills, whereas a quarter of participants said that they do not improve their communication skills by using the mobile devices.

Focusing on the way the use of mobile devices can contribute to the successful acquisition of ESL communication skills, as presented in Table 5.12, the findings from 18 participants concerned revealed that mobile devices can contribute to the users’ improvement of communication skills by facilitating or creating an environment in which to practice the language, by facilitating the acquisition of new words, or a combination of both.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	6	25.0	25.0	25.0
Language practice	5	20.8	20.8	45.8
New words	8	33.3	33.3	79.2
New words and language practice	5	20.8	20.8	100.0
Total	24	100.0	100.0	

Table 5.12: Mobile device contribution to English communication skills

5.2.6. Conversational Management

According to Krashen (1982:127), adequate L2 input “provides tools for conversational management”. Krashen (1982:129) adds that the L2 input should “help the students [to] manage conversations with native speakers”.

To investigate this requirement for optimal language input, statistical data on how mobile devices can contribute to the sustainable interactional process between the users and native speakers of English were collected and analysed. As illustrated in Table 5.7, all the participants were asked whether using mobile devices could help them interact with native speakers of English, and improve their communications skills. Of the 24 research participants, 19 (79.2%) said that their mobile devices help them in English language conversational management, whereas 5 participants (20.8%) answered that the mobile devices do not help them with conversational management.

As most of the L2 learners in this study do not interact freely in the target language with its native speakers, the use of mobile devices to improve their users’ communication skills, the topic that was discussed in section 5.2.5, was again investigated. Participants were asked to provide more details about how the mobile devices could help them to improve their communication skills in ESL, and their answers are presented in the following Table 5.13:

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	5	20.8	20.8	20.8
Creating an interactional setting	8	33.3	33.3	54.2
Creating the connectivity and interactional setting with English native speakers	6	25.0	25.0	79.2
Providing new word meaning and pronunciation	2	8.3	8.3	87.5
Providing the communication facilities	3	12.5	12.5	100.0
Total	24	100.0	100.0	

Table 5.13: The use of mobile devices in conversational language

5.3. Sharples' Approach in the Context of Rwanda

According to Sharples (2009), mentioned in Chen (2013:28), “a useful way to approach the evaluation of mobile assisted language learning (MALL) technology is to address its usability (will it work?), effectiveness (is it enhancing learning?), and satisfaction (is it liked?)”. Therefore, in addition to the analysis of the students' results in an evaluation test administered to the research participants at UR (see Appendix 2), these three variables, as summarized in Table 5.14, were studied by using the research questionnaire (see the third section of Appendix 1):

<i>Variable</i>	<i>Question</i>
i. Usability	Do you think using mobile technologies for learning purposes is possible at UR? Please explain your answer.
ii. Effectiveness	Can using your mobile device contribute to your successful learning of ESL and other courses at the university, and to your success in other activities? Please explain your answer.
iii. Satisfaction	Would you be happy to use a mobile device as a supporting tool for ESL learning purposes? Please explain your answer.

Table 5.14: Evaluation of MALL at UR

5.3.1. MALL Usability

As stated in Table 5.14, participants were requested to express their points of view about the possibility to use mobile technologies for language learning purposes at UR, and three of them (12.5%) said that MALL is not possible in Rwanda, whereas 21 (87.5%) answered that it is possible.

In addition to a yes-or-no question about the research participants' views on the possibility of implementing MALL in Rwanda, further details were requested, and are presented in Table 5.15.

	Frequency	Percent	Valid Percent	Cumulative Percent
Mobile technologies should be allowed in classrooms	1	4.2	4.2	4.2
There should be financial support for university students for mobile technologies use	4	16.7	16.7	20.8
There should be training and financial support for university students for mobile technologies use	4	16.7	16.7	37.5
There should be training for university students about using mobile technologies	2	8.3	8.3	45.8
Using mobile technologies for language learning purposes should be included in the university academic programme	1	4.2	4.2	50.0
Using mobile technologies for learning purposes is possible	12	50.0	50.0	100.0
Total	24	100.0	100.0	

Table 5.15: Students' views on MALL usability in Rwanda

Of the 24 participants, 12 (50%) said that MALL is just possible in Rwanda, whereas the remaining participants said that MALL is possible in Rwanda under some conditions, such as providing financial and technical support to students, allowing the use of mobile devices inside the classroom, as well as including MALL within the university academic programmes.

5.3.2. MALL Effectiveness

To study the effectiveness of mobile-assisted language learning (MALL) in Rwanda, the research participants were asked whether using mobile technological devices could contribute to their successful learning of English and

other courses at university, and to their success in other activities. All the participants, including the ones who do not have their own devices (Table 5.3), answered that mobile devices could be effective to their success in the university studies and other activities.

Of the ways in which mobile devices can contribute to the successful learning of English as a second language (ESL) in Rwanda, 45.8% of the research participants mentioned the users' exposure to rich and comprehensible input, and the remaining participants said that mobile devices facilitate the communication process, and allow the users to easily access the ESL learning resources (see Table 5.17).

	Frequency	Percent	Valid Percent	Cumulative Percent
Mobile devices just contribute to the successful learning of ESL	1	4.2	4.2	4.2
Mobile devices expose the users to the ESL rich and comprehensible input	11	45.8	45.8	50.0
Mobile devices facilitate easy access to ESL learning resources	4	16.7	16.7	66.7
Mobile devices facilitate the communication	6	25.0	25.0	91.7
Mobile devices facilitate the communication and easy access to ESL learning resources	2	8.3	8.3	100.0
Total	24	100.0	100.0	

Table 5.16: Students' views on how mobile devices contribute to the successful ESL learning

5.3.3. Student Satisfaction with MALL

To investigate mobile device user satisfaction, as shown in Table 5.14, all the research participants were asked whether they would be happy to use a mobile device as a supporting tool for ESL learning purposes, and only two participants (8.3%) who did not have their own devices said that they were not happy with MALL, may be due to the lack of experience with it, whereas the remaining 22 (91.7%) answered that they would be satisfied with using their mobile devices for language learning purposes.

As mentioned earlier in this thesis, especially in section 2.1.2, particularly in subsections 2.1.2.4 and 2.1.2.6, mobile devices have the potential to make the majority of users feel satisfied with mobile device features and succeed in their activities. Focusing on mobile device features and facilities that satisfy the majority of students in Rwanda, the research participants mentioned the following:

- Mobile devices are accessible anytime from everywhere,
- Mobile devices are easy to operate,
- Mobile devices are cheaper than the traditional computers,
- Mobile devices are personal and portable,
- In addition to facilitating the communication process, mobile devices allow an easy access to online and offline books, applications and other learning materials.

	Frequency	Percent	Valid Percent	Cumulative Percent
Not applicable	2	8.3	8.3	8.3
They are accessible anytime from everywhere, and they are easy to operate	1	4.2	4.2	12.5
They are accessible anytime, and from everywhere	4	16.7	16.7	29.2
They are accessible anytime, from everywhere, and they are cheaper than the traditional computers	1	4.2	4.2	33.3
They are personal, portable, cheap, and easy to operate	4	16.7	16.7	50.0
They can help the students to access books and other learning materials	3	12.5	12.5	62.5
They can help the students to successfully pass the exams	3	12.5	12.5	75.0
They simplify everything, especially communication and access to online learning materials	6	25.0	25.0	100.0
Total	24	100.0	100.0	

Table 5.17: The potential of mobile technological devices

5.4. Evaluation Test

In addition to the research data collected by using the survey methods, as described in section 3.1, and discussed in section 4.2 especially in subsection 4.2.6, a test (Appendix 2) was administered to the research participants in order to determine quantitatively the extent to which the use of mobile devices can positively contribute to the academic performance of this group of university students in Rwanda. To ensure the reliability of the test administered to the research participants (see section 3.2), using one of UR student prescribed books, and the calculation of the text readability level (see sections 4.2.3 and 4.2.4) were considered prior to the administration of the test.

According to Krashen (1982:126), “when students study for the test, they should be doing things that encourage or cause second language acquisition”. With respect to this statement, and with consideration to the acquisition of writing, reading, listening and speaking skills in English as a second language (ESL), a test (see section 4.2 and Appendix 2) that could contribute to the students’ acquisition of ESL was prepared and administered to all the research participants, i.e. both the control group (see section 3.2.2) and the experimental group (see section 3.2.1).

The students’ results were downloaded from SUNLearn (see section 4.2.6) as a Microsoft Excel workbook. Then the results were exported to and analysed by STATISTICA by using the analysis of variance (ANOVA) method. With the use of 0.95 confidence intervals, the Mann-Whitney U-test was used to compare the experimental and control group performance on the test, i.e. the null hypothesis will be adopted if the probability value (p-value) is greater or equal to 0.05, and the alternative hypothesis (that is the research hypothesis formulated and discussed in section 1.4.2) if the p-value is less than 0.05. Regarding this research, as it is discussed in this section, particularly in subsections 5.4.2 and 5.4.3, the significant p-value ($p < 0.01$) was obtained as far as hypothesis verification is concerned.

5.4.1. Reading and Writing Skills

To assess the performance, as far as reading and writing skills are concerned, a text was selected from one of the prescribed books for students, and used for the gap-fill quiz in the first section of the test (see section 4.2.2 and Appendix 2). All the research participants were requested to fill 15 gaps in the extract from Yule (1996)³ with 15 technical words that were provided. In order to successfully

³ Yule, G. 1996. *The study of language*. Second edition. Cambridge: Cambridge University Press.

finish this task, the participating students had to read and fully understand both the text for which the readability score was 44 (see sections 4.2.3 and 4.2.4), as well as the technical terms that they had to use to fill the gaps.

The students' results in the test showed that the experimental group outperformed the control group. All the experimental group members successfully passed the first section of the test (Appendix 2), whereas all the control group members failed in this task. In addition to the use of mobile devices as discussed in section 3.4, and the training and guidance about using mobile devices for language learning purposes as discussed in section 3.2.1, factors like motivation (see section 4.3), interest in and positive attitudes towards the research and the researcher, as well as frequent interactions with the researcher, even though they were not investigated, might have contributed to the remarkable success of the experimental group. In addition to focusing on the listening and speaking skills, the following sections provide the graphic presentation of results for both the experimental and the control group in the test.

5.4.2. Listening and Speaking Skills

As discussed in section 4.2.5 of this thesis, in addition to the use of reading material, two audio clips were used for assessment as, according to Abdous, Camarena and Facer (2009:77), the use of audio clips as teaching, learning and assessment tools can “enable students... to expand their vocabulary, and to build oral and aural skills”. By comparing the experimental (see section 3.2.1) and control (see section 3.2.2) group results in the listening and speaking skills related sections of the test (Appendix 2), the following subsections quantitatively discuss the extent to which the formulated research hypothesis (see section 1.4.2) can be either rejected or adopted.

5.4.2.1. Task One: Learning Vocabulary

As explained in section 4.2.2, the test that was administered to the research participants was composed of three sections, among which the second was entitled 'Learning Vocabulary'. In this section, both sample groups had to listen to the podcast entitled 'Learning vocabulary', in which a French university student talks about learning English and the difficulties he has with it; then to choose and circle the difficulties he mentions among the ten listed statements. Then, the group results mean, the group standard deviation (Std.Dev) and the group p-value were calculated in order to compare the performance of the research experimental and control groups respectively.

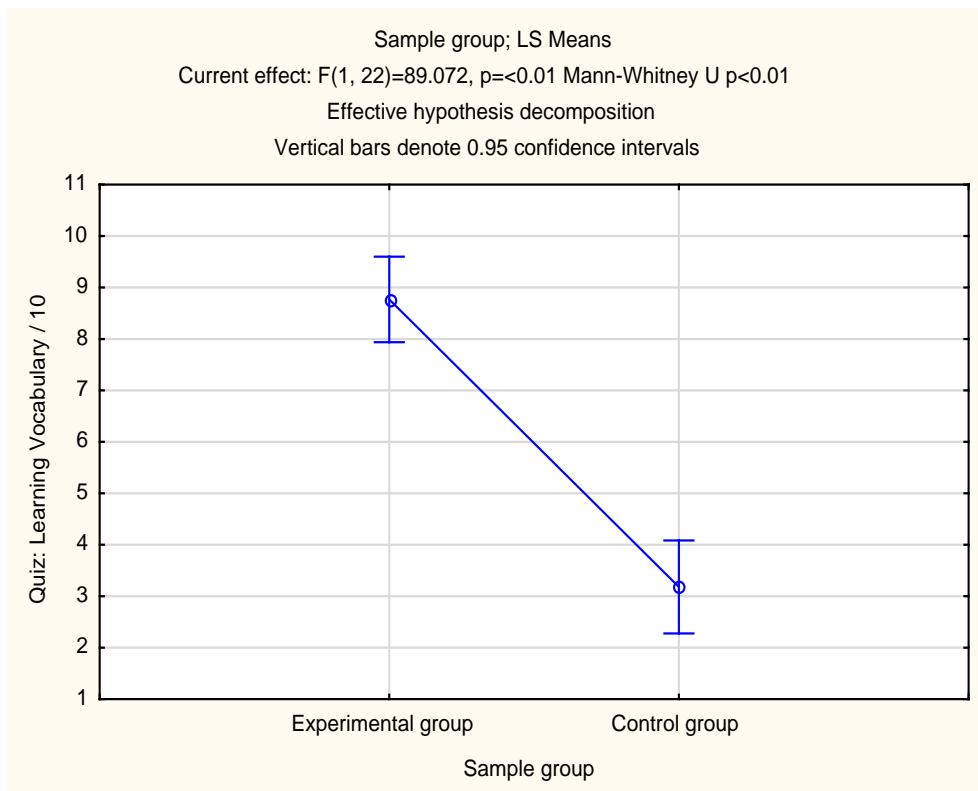


Figure 5.1: The quiz second section results

The students' score in this section ranges from 1 to 10. The score for the experimental group ranges from 7 to 10, whereas for the control group it ranges from 1 to 7. The general mean for the section is 6.21, and it indicates that the task was relevant to the research participants. As illustrated in Figure 5.10, the

experimental group remarkably outperformed the control group. The mean for the experimental group is 8.77, whereas it is 3.18 for the control group. The Std.Dev is 0.93 for the experimental group whereas it is 1.89 for the control group, i.e. the scores for the experimental group members are closer to the mean than the scores of the control group members.

As far as the adoption of null hypothesis or alternative hypothesis is concerned, as discussed at the beginning of the section 5.4, the null hypothesis will be adopted if the probability value (p-value) is greater or equal to 0.05, and alternative hypothesis if the p-value is less than 0.05. Focusing on this section, as illustrated in Figure 5.10, $p < 0.01$ completely rejects the null hypothesis that mobile-assisted language learning (MALL) cannot positively help university students in Rwanda to successfully acquire ESL by exposing them to a rich and comprehensible input, and supports the alternative hypothesis as stated in section 1.4.2 of this thesis.

5.4.2.2. Task Two: The Future of English

As Appendix 2 shows, the second task related to ESL listening and speaking skills corresponds to the third section of the test. The research participants were required to listen to the podcast entitled 'Future of English' in which an experienced linguist talks about the future of the English language, and then the students had to decide whether the listed statements were 'true' or 'false' based on the speaker's argument. Similar to the second section of the test as discussed in the subsection 5.4.2.1, the means and p-values of both control and experimental groups were calculated and compared.

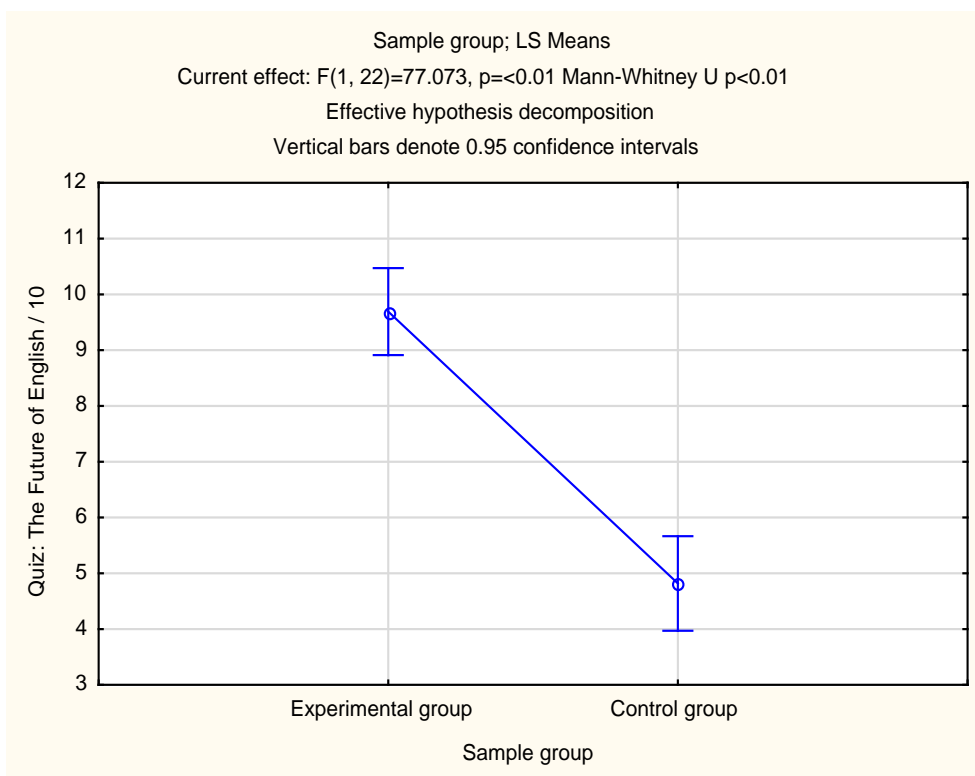


Figure 5.2: The quiz third section results

As illustrated in Figure 5.11, the experimental group again outperformed the control group in the third section of the test. For the experimental group, the minimum and maximum scores were relatively 9 and 10; while for the control group they were relatively 2 and 8. The mean for the experimental group is 9.69, which is considerably higher than the mean for the control group which is equal to 4.82.

As far as hypothesis verification is concerned, the p-value for the third section is equal to 0.00000, indicating that the null hypothesis should be completely rejected similarly to the previous task as discussed in the subsection 5.4.2.1. In other words, the students' results in the third section of the test supported the alternative hypothesis as formulated and stated in the section 1.4.2 of this thesis, i.e. that the use of mobile devices can positively contribute to the university students' success in second language acquisition (SLA).

5.4.3. Accumulative Test Results

As discussed in the previous sections of this thesis, particularly in section 4.2, and as presented in Appendix 2, the test that was administered to the research participants was composed of three sections which were marked out of 35 in total. In addition to the total score for each of the research participants, the percentage was calculated, and the comparison of the mean and Std.Dev for both the experimental and control groups was done. These are presented in the following Table 5.19 of which details are discussed in the subsections below.

Sample group		Total /35	Per /100
Control group	Mean	8.00	22.86
	N	11	11
	Std.Dev	2.32	6.64
Experimental group	Mean	33.46	95.60
	N	13	13
	Std.Dev	0.97	2.76
Total	Mean	21.79	62.26
	N	24	24
	Std.Dev	13.07	37.34

Table 5.18: The overall percentage and total results

5.4.3.1. Total Results

The total score for the test that was administered to the university students who participated in this research project was 35. As far as the general image of the students' success in the test is concerned, as presented in Table 5.19, and illustrated in Figure 5.12, the experimental group performed significantly better than the control group. The total score for the entire sample ranges from 5 to 35, within which the total score for the experimental group ranges from 32 to 35, and from 5 to 12 for the control group.

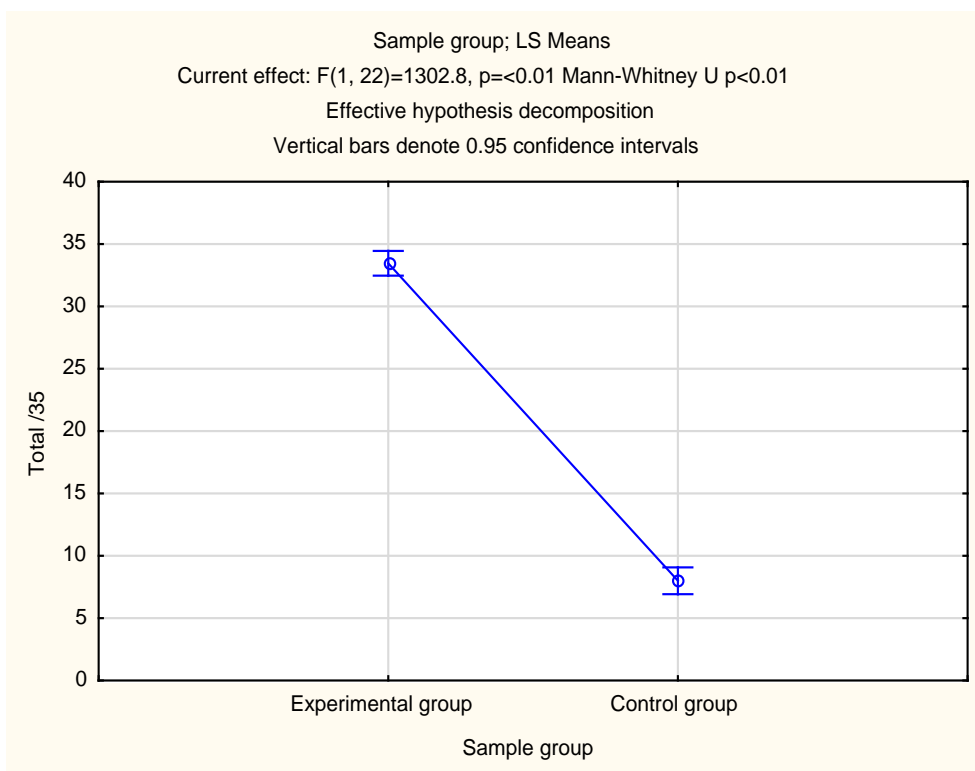


Figure 5.3: Students total results

Both Table 5.19 and Figure 5.12 show that the mean for the experimental group is higher than the mean for the control group, i.e. the experimental group outperformed the control group as was assumed by the formulated hypothesis of this thesis. Concerning the test relevance to the research participants, in addition to its readability score that was calculated as discussed in sections 4.2.3 and 4.2.4, the general mean that is equal to 21.79 confirms that the test was relevant. And the general Std.Dev that is equal to 13.07 shows that there is a significant difference as far as the students' performance is concerned.

Focusing on the difference between the experimental and control groups, the mean for the experimental group is 33.46, and is higher than the mean for the control group which is equal to 8. The experimental group performed more than three times better, than the control group. The Std.Dev for the control group is 2.32, and is higher than the Std.Dev for the experimental group which is 0.97. In other words, the score for experimental group members ranges closer to the corresponding mean than the score of the control group.

To verify the formulated research hypothesis, the p-value for the accumulative students' results was calculated. As it is presented in Figure 5.12, $p < 0.01$ means that the research findings rejects the null hypothesis, and adopt the alternative hypothesis as stated in section 1.4.2.

5.4.3.2. Overall Percentage

For the purpose of ranking all the university students who participated in this research in Rwanda, the percentage of their results obtained from the test administered to them was calculated, the corresponding statistical analysis and graphic presentations were done, and these are the focus of this subsection. Like the verification of hypothesis was done for each of the sections composing the test as well as for the accumulative students' results as discussed in the previous subsections of section 5.4, the p-value for the students' percentage was also calculated.

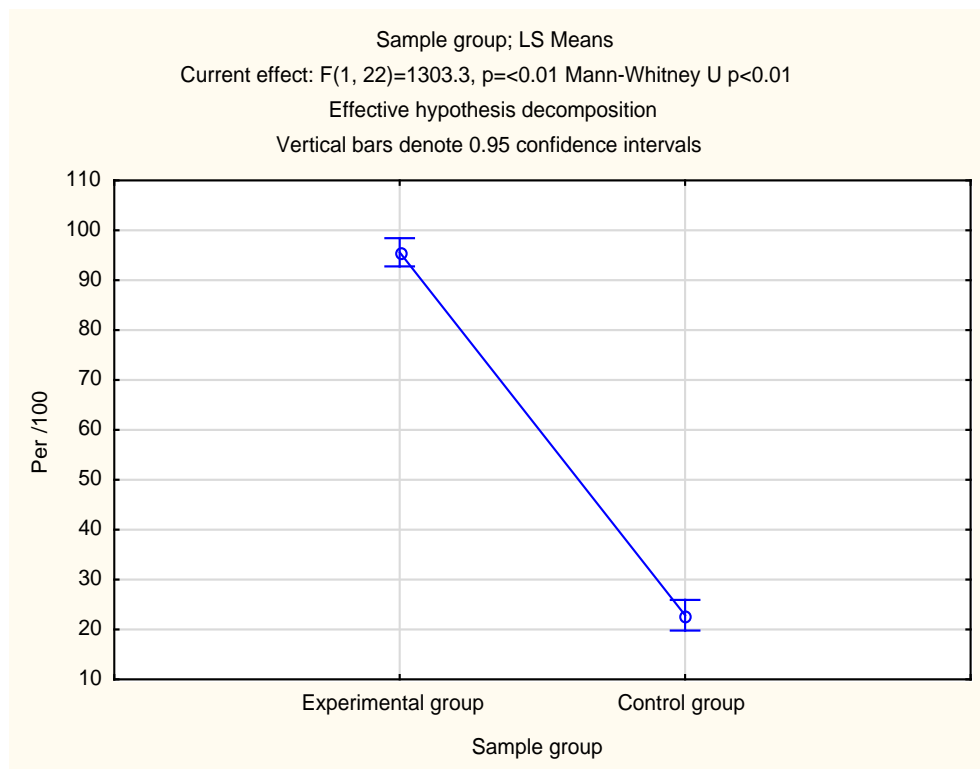


Figure 5.4: Students accumulative percentage

For all the research participants, the percentage marks range from 14.29 to 100, and as can be seen in Table 5.19, the general mean is 62.26 with a Std.Dev of 37.34. Regarding the difference between the control group and the experimental group, as presented for all the sections of test previously discussed in this section, the experimental group performed better than the control group, as it was assumed within the hypothesis (see section 1.4.2) because of the use of mobile devices that exposed the experimental group to an ESL rich and comprehensible input prior the test. Focusing on the students' percentage marks, as illustrated by Figure 5.13 and Table 5.19, the mean for the experimental group is 95.60, and is higher than the mean for the control group which is 22.86. And the Std.Dev is 6.64 for the control group, whereas it is 2.76 for the experimental group. The mean and Std.Dev for each of the research groups, and $p < 0.01$ as presented in Figure 5.13, reject the null hypothesis, and support the alternative hypothesis (section 1.4.2).

5.5. Conclusion

As discussed in section 1.3 of this thesis, in the context of mobile assisted language learning (MALL), this study had the objective of assessing ESL input comprehension by university students in Rwanda. In this framework, the use and application of different research methods, and the integration of second language acquisition (SLA) theories (see section 2.2) were done. By using the survey methods (see section 3.1, section 4.1 and Appendix 1) and administering an evaluation test (see section 4.2 and Appendix 2) to both control and experimental groups (see section 3.2), on the basis of SLA theories, especially Krashen's input hypothesis (see section 2.2.1), and with reference to Sharples' approach (discussed in section 3.1.1) to evaluate the use of modern technologies, this research has determined the extent to which mobile devices can contribute to ESL acquisition in Rwanda.

This chapter focused on the analysis and interpretation of data collected by the use of the questionnaire and the quiz, both tools administered to all the research participants. As discussed in the section 2.2.1 of this thesis, Crystal (2008:247)

defines second language (L2) input as “what the learner hears and attempts to process” in that language, and as mentioned in section 2.2.1.2, Krashen (1982:21) says that this L2 input must be comprehensible for successful acquisition or learning to happen. In order to determine the extent to which the L2 input is rich and comprehensible, Krashen (1982) provided the list of six requirements for optimal input (see section 3.1.1), the requirements that, in addition to the Sharples’ approach, guided this study.

As presented and discussed in this chapter, the findings of this research answered the research question (see section 1.4.1), and supported the formulated hypothesis (see section 1.4.2). By integrating Krashen’s Input Hypothesis and the Sharples’ Approach for Modern Technology Evaluation within the survey, and by verifying the survey results by administering an evaluation test of which the findings were presented and discussed in section 5.4, this research found that the use of mobile devices can contribute to the successful acquisition of ESL in Rwanda by helping the students to access and process rich and comprehensible input, in an easy and cheap way, from any place and at any time because of the mobile device features discussed in section 2.1.2, especially in the subsections 2.1.2.4 and 2.1.2.6.

Chapter 6: CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

6.1. Summary

In discussing the importance of “open content” feature provided by the use of modern technologies, Richardson (2010:149) states the following:

It used to be that schools and teachers owned the content they taught in their classrooms. Most curriculum was taught from a textbook with a few added resources thrown in. Perhaps there was a filmstrip... or a video that added to the discussion. Outside of what schools provided, however, students had limited access to additional information about the subjects they were studying. There were newspapers and magazines, and there were books in the school and public libraries, but all of these resources required more time and effort than the average student wanted to expend.

This research was designed to address the problem of the lack of rich and comprehensible input within the second language acquisition (SLA) process, with the focus on the acquisition of English as a second language (ESL) in the context of Rwanda, which is a multilingual developing country (see section 2.4.2), of which the linguistic situation does not favour the acquisition of ESL in any setting other than the formal language classroom.

As was discussed in section 1.1 of this thesis, the use of computers, tablets, mobile phones and other technological devices has become one of the most important tools in almost every life activity, including SLA. As presented in Table 6.1 below, Erstad (2011:107) distinguishes between “different aspects and categories of digital literacy”, which are necessary for everyone, particularly students, in the current digital world. But due to different economic problems that are mostly faced by the poor and developing countries (see section 2.4.1 for the Rwandan case), not everyone is able to own, or have access to, technological tools that favour the development of digital literacy.

Computer assisted language learning (CALL) that involves the use of computers in language acquisition and learning processes (see section 2.1.1), as well as mobile assisted language learning (MALL) that involves the use of mobile technological devices within the language teaching and learning process (see section 2.1.2) are two of the possible solutions to the problem faced by most second language (L2) learners, which is the lack of a rich and comprehensible input as stated above. As far as this study is concerned, as discussed in previous chapters of this thesis, especially in Chapter 2 and Chapter 5, MALL has more potential to help L2 learners process and boost the received language input, and, therefore, to acquire or to learn successfully the L2 concerned, than traditional CALL.

Aspects and categories	Meaning
Basic skills	Be able to open software, sort out and save information on the computer or any other electronic device, and other simple skills in using the computer, the mobile device and software.
Download	Be able to download different information types from the Internet.
Search	Be aware of and know how to get access to information.
Navigate	Be able to orient oneself in digital networks and learning strategies in using the Internet.
Classify	Be able to organize information according to a certain classification scheme or genre.
Integrate	Be able to compare and put together different types of information related to multimodal texts.
Evaluate	Be able to check and evaluate the information one seeks to get from searching the Internet. Be able to judge the quality, relevance, objectivity, and usefulness of the information one has found. Be able to evaluate sources critically.
Communicate	Be able to communicate information and express oneself through different mediational means.
Cooperate	Be able to take part in net-based interactions of learning, and take advantage of digital technology to cooperate and take part in networks.
Create	Be able to produce and create different forms of information as multimodal texts, make web pages, and so forth. Be able to develop something new by using specific tools and software. Be able to remix different existing texts into something new.

Table 6.1: Aspects and categories of digital literacy (adapted from Erstad 2011:107)

Table 6.1 illustrates different types of digital literacy that are common as far as traditional computers and mobile devices are concerned, and which make mobile devices the most suitable tools for language learning as they have additional features such as mobility (section 2.1.2.6) and portability (section 2.1.2.4).

The integration of Sharples' approach (see sections 3.1 and 5.3) of evaluating the use of modern technologies for language learning (see section 2.1) with the traditional SLA theories and hypotheses (see sections 2.2 and 5.2) helped this study to find the extent to which mobile devices can contribute to the successful acquisition of ESL in Rwanda. The use of experimental (see section 3.2.1) and control groups (see section 3.2.2) showed that L2 learners that use their mobile devices for L2 input processing outperform those who only learn the language from the formal classroom and use traditional methods for input processing such as printed books, journals and newspapers available from the physical libraries (see Chapter 5, especially section 5.4). In addition to the potentialities that mobile technology has within SLA, as discussed in section 5.3 of this thesis, this research has found that MALL is possible and easy to implement in a developing country such as Rwanda, to overcome the second language acquisition (SLA) problems that may be linked to the use of traditional desktop computers as discussed in section 2.1.1.5.

6.2. Conclusions and Recommendations

According to Thomas (2011:1), in some education institutions, “instructors have made great efforts to integrate digital technologies in order to enhance learners’ access to information and collaborative activities”, whereas in other institutions, the use of any technological device inside the classroom is completely banned for learners. About the contribution of mobile devices to the acquisition of a second language in the context of a developing country, the topic that was investigated within this project, the final conclusions (section 6.2.1) and recommendations for future research (section 6.2.2) are provided below.

6.2.1. Conclusions

According to Cohen, Manion and Morrison (2007:133), “validity is an important key to effective research”. Among other types of validity, ‘content validity’ is demonstrated by showing that the study has successfully covered “the domain or items that it purports to cover” (Cohen, Manion and Morrison 2007:137). In this regard, this section discusses the content validity by linking the findings of this study (discussed in the Chapter 5) to the formulated hypothesis as discussed in section 1.4.2, and the research questions as posed in section 1.4.1, as well as the research objectives as stated in the section 1.3 of this thesis.

As far as the research objectives are concerned, the participants in the experimental group (see section 3.2.1) were exposed to the use of mobile technologies for language learning purposes. The use of language learning mobile tools (see sections 3.4.1 and 3.4.2) was introduced, and the university ESL students’ academic performance, which is mostly determined by the students comprehension level, was assessed by the use of a test (see section 4.2) which was administered on one hand to the experimental group in order to assess the academic performance of students who use their mobile devices for ESL learning purposes, and on the other hand to the control group (see section 3.2.2) in order to assess how students perform academically without the use of mobile devices and, therefore, by comparing both groups, to determine the extent to which mobile devices can contribute to ESL acquisition and student success in Rwanda.

As discussed in the section 1.4.1 of this thesis, this study focused on the acquisition of a second language (L2) in the context of Rwanda, which is a developing country where the linguistic situation as discussed in section 2.4.2 does not favour the successful acquisition of ESL. As an answer to the research question, in the context of UR, this study found that mobile assisted language learning (MALL) can contribute to the successful acquisition of ESL in Rwanda by exposing the students to rich and comprehensible input, and by helping them to

boost and process the input that they receive in their formal English language classroom.

Regarding the input received in the formal classroom, the state of availability of, and access to ESL teaching and learning resources in Rwanda can be explained by Richardson (2010:149) who states that “outside of what schools provided, ... students had limited access to additional information about the subjects they were studying”. Students in Rwanda can find books, journals, newspapers, magazines, and digital resources either from the university and school libraries, or from the public libraries, but according to Richardson (2010:149), “all of these resources required more time and effort than the average student wanted to expend”. In the process of finding a solution to this problem, as discussed in the previous paragraph, this study has found that MALL can help students in developing countries such as Rwanda, to successfully acquire an L2, by exposing them to rich and comprehensible input; and this finding has supported the research hypothesis as it was presented in section 1.4.2 of this thesis.

6.2.2. Recommendations

With reference to the scope and limitations of this study as discussed in the section 1.5 of this thesis, and in accordance with Dang (2013:475) who states that new studies on the use of mobile devices “for educational and English language learning purposes” are needed to contribute to, and to fill the gap within, the available literature as discussed in section 2.1.2, the following are the recommendations for future research:

- As this study was mostly limited to the integration of mobile-assisted language learning (MALL) with Krashen’s Input Hypothesis as an approach to the successful second language acquisition (SLA) process, future research would consider one of, or both MALL and computer-assisted language learning (CALL) in integration with other theories and approaches to SLA in the context of the increasing availability of technology.

- As stated in section 1.5, this study, which emphasized the case of SLA at university level in a developing country, was limited in time and budget, therefore limited in its sample and population sizes. This implies that there is a need for comparative research on the contribution of MALL to the acquisition of a second language (L2) in the context of a developing country, the research that would be conducted on a larger population and larger sample sizes over a longer period of time. In addition to this, there is a need for comparative research in the matter of education level such as pre-schooling, primary, secondary and tertiary levels, and in the matter of the national economic levels such as poor, developing and developed countries.

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APPENDICES

Appendix 1 : Questionnaire for ESL Students at UR

<p>RESEARCH QUESTIONNAIRE</p> <p>Framework: Research Project in Technology for Language Learning</p> <p>By: Valentin Uwizeyimana (16518411)</p> <p>Supervisor: Ms Elizabeth K. Bergman</p>
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1. Background Information on Participants

<i>Variable</i>	<i>Question</i>	<i>Measure</i>
i. ESL learning at university	Do you study English language as one of your major subjects? If no, what is your major subject?	0 = No 1 = Yes
ii. Access to mobile technologies	Do you own a mobile device? If yes, which one?	0 = No 1 = Yes
iii. The use of mobile technologies	Do you use your mobile device for specific purposes? If yes, which are they?	0 = No 1 = Yes
iv. Use of mobile technologies for ESL learning purposes	Do you use your mobile device for English language learning purpose? If yes, how do you use it?	0 = No 1 = Yes

2. MALL and Optimal ESL Input

<i>Variable</i>	<i>Question</i>	<i>Measure</i>
i. Input comprehensibility	Does using a mobile device help you to learn and understand the meaning of new English words which are necessary for understanding the input received from your classroom?	0 = No 1 = Yes
ii. Interesting and relevant input	Does using a mobile device help you to learn the new words you need for the success in your activities, and the new words that are relevant to the context? If yes, in which activities and context?	0 = No 1 = Yes
iii. Input grammatical	Does the content you get by using your	0 = No

sequence	mobile device help you to understand English grammatical rules? If no, with what does it help you? It can help you to improve communication skills for example.	1 = Yes
iv. Input quantity	Does using your mobile device expose you to rich comprehensible English language learning resources? If yes, what are those resources?	0 = No 1 = Yes
v. Filter strength	Does using your mobile device help you to improve your communication skills in the English language? If yes, how?	0 = No 1 = Yes
vi. Conversational management	Does using your mobile device help you to interact with English language speakers, and improve your communication skills in English as a second language (ESL)? If yes, how?	0 = No 1 = Yes

3. Sharples' Approach in the Context of UR

<i>Variable</i>	<i>Question</i>	<i>Measure</i>
i. Usability	Do you think using mobile technologies for learning purposes is possible at UR? Please explain your answer.	0 = No 1 = Yes
ii. Effectiveness	Can using your mobile device contribute to your successful learning of ESL and other courses at the university, and to your success in other activities? Please explain your answer.	0 = No 1 = Yes
iii. Satisfaction	Would you be happy to use a mobile device as a supporting tool for ESL learning purposes? Please explain your answer.	0 = No 1 = Yes

Appendix 2 : Evaluation Test to ESL Students at UR

EVALUATION FOR STUDENTS AT UNIVERSITY OF RWANDA

Framework: Research Project in Technology for Language Learning

By: Valentin Uwizeyimana (16518411)

Supervisor: Ms Elizabeth K. Bergman

1. Student identification

Names:.....

Year/Level of studies:.....

2. Introduction

This evaluation test is not related in any way to the academic program of University of Rwanda (UR), and the students' results will not affect in any manner the results in their studies at UR or at any other institution. This test is in the framework of the research project in the area of technology for language learning, which is focusing on the contribution of mobile devices on students' academic performance at UR. It will be administered once to students, and all along the interpretation of the results, the students' anonymity and confidentiality will be respected. The results from this test will only be kept and used for the research purposes only, by the principal researcher in this project.

3. Instructions

This test is composed of three sections. The first section is made of gap questions, and it aims at evaluating how the students can succeed according to their knowledge of, or ability to understand enough vocabulary, i.e. language input. The second and the last ones focus on listening comprehension, and they are related to the students' knowledge about accessing and using digital English language resources. The resources concerned are available from the website of British Council's initiative called 'Learn English Professionals', www.britishcouncil.org/learnenglish. The resources are online accessible, and

available offline for the students participating in this research. All the students participating in this study are requested to answer all of the questions.

Section One: GAP QUESTIONS

By using the following words, please fill the gaps in this extract from Yule (1996)⁴: **artificial intelligence; syntactic rules; pattern-matching systems; conversational partner; artificial language; dictation systems; speech recognition; modeling of intelligence; acoustic properties; language production; speech synthesis; vocal tract; articulation; mental processes; navigators.**

LANGUAGE AND MACHINES

In 1738, Jacques de Vaucanson produced a fabulous mechanical duck. It could perform the amazing feat of drinking water and eating grain which was digested and then excreted via a mysterious chemical process and some complex tubing in its stomach. This mechanical marvel is simply one example in a long line of machines which humans have created in imitation of living organisms. The interesting thing about Vaucanson's machine is that it simulated digestion without actually containing a replica of the digestive system. It can be seen as an exercise in working with available technology to create a model of some internal processes of a duck. Note that it is a model, not a replication. This is an important point, since the aim of many such exercises is not to mimic the details of an internal process, but to have the output of the model be indistinguishable from the output of the real thing. By all accounts, the duck's output passed as genuine.

However, the kind of output which we are more interested in is the result of natural language processing by a machine, or, more specifically, a computer. It is necessary to specify that it is a natural language (e.g. English) rather than an **artificial language** (e.g. BASIC), since it is the human capacity to use language

⁴ Yule, G. 1996. *The study of language*. Second edition. Cambridge: Cambridge University Press.

that is being modeled.

SPEECH SYNTHESIS AND RECOGNITION

One of the first aspects of natural language to be modeled was the actual ***articulation*** of speech sounds. Early models of talking machines were essentially devices that mechanically simulated the operation of the human ***vocal tract***. More modern attempts to create speech electronically are generally described as ***speech synthesis***, and the resulting output is called synthetic speech. From one point of view, it seems remarkably simple. Take the set of phonemes of English, electronically reproduce the acoustic properties of these sounds, then select those phonemes which make up the pronunciation of a word and play the word. While this is not as easy as the brief description suggests, synthetic speech has indeed been produced in this way. It sounds terrible. More tolerable facsimiles of speech have been produced by having machines analyze key ***acoustic properties*** of spoken words (not individual sounds) and store the pronouncing information at the word level. In many parts of the United States, when you ask Directory Information for a telephone number, the spoken (seven digit) number which you hear is an example of a synthetically produced set of seven words.

A similar approach was adopted in many ***speech recognition*** systems. Very basic programs, called ***navigators***, allow computers to follow simple spoken commands (e.g. open filename) that the computer has stored as sound units in memory. These programs can replace many keyboard functions. More complex programs, called ***dictation systems***, can have much larger recognition vocabularies and can create written text from speech at a fast rate. Typically such systems require very clear speech and have to be trained to recognize the user's voice. This may be an advantage for a security system (the machine only obeys your voice), but is a major disadvantage for general use by any speaker. Speaker-independent systems tend to have about five times error rate of speaker-dependent systems. It is, however, just a matter of time before experimental speaker-independent systems (currently successful on limited tasks) become widely available. Even then, however, they will probably remain

pattern-matching systems (recognizing only and exactly what they already know).

There are similar problems with making synthetic speech systems more flexible. There is more to speech production than the pronunciation of words. Intonation and pausing, for example, have to be included, as well as **syntactic rules** for formation of natural language sentences. Care has also to be taken that the natural processes of assimilation and elision are not ignored. As a result of research in this area, increasingly sophisticated models of speech production have been developed and more natural sounding synthetic speech has been achieved. However, the development of synthetic speech, even if highly successful, would only produce a model of speech articulation. It would not be a model of speaking. The human activity of speaking involves having something to say and not just a means of saying it. Having something to say is an attribute of the human's **mental processes** and attempting to model that attribute is, in effect, the **modeling of intelligence**.

ARTIFICIAL INTELLIGENCE

The investigation and development of models of intelligent behavior is generally undertaken in the field of **artificial intelligence**, which has been defined as the science of making machines do things that would require intelligence if done by men. This field ranges over a large number of topics (e.g. problem-solving, game-playing, visual perception), but has always taken **language production** and understanding as a major area of investigation. While one ultimate goal may be to produce a computer which can function as a **conversational partner**, most of the research has been devoted to developing models to cope with language interaction which can take place at a computer terminal. Consequently, descriptions of conversations in this field typically refer to typed rather than spoken dialogs.

Section Two: CIRCLE THE RIGHT STATEMENT

Listen to the British Council's podcast entitled 'Learning vocabulary', accessible

from http://www.learnenglish.org.uk/prof_mp3/Learning_Vocabulary.mp3, and available offline, in which Olivier who is a French university student, talks about learning English and the difficulties he has; then circle the difficulties he mentions.

1. It's difficult remembering long words.
2. I often repeat words.
3. I don't know enough words.
4. I find it difficult to write letters.
5. I quickly forget new words.
6. It's harder to learn general English words than business vocabulary.
7. It's difficult talking about a subject that I don't know.
8. I can only talk about music in English.
9. I don't learn business vocabulary with the young people I meet.
10. I concentrate so hard on understanding the gist of the conversation that I don't hear individual words.

Answers: 2, 3, 5, 7, 9 and 10

Section Three: ANSWER BY 'TRUE' OR 'FALSE'

Listen to the podcast by British Council, which is available offline, and accessible from http://www.learnenglish.org.uk/prof_mp3/future-of-english.mp3. In this podcast entitled 'Future of English', a linguist talks about the future of English, and according to the speaker, decide whether the following statements are 'true' or 'false':

1. If you do not know English you can be at a disadvantage.
2. English will soon be spoken by everybody in the World.
3. English cannot be an obligatory subject on every school curriculum.
4. By 2010 half the World's population will speak English.
5. Competitors at the Eurovision Song Contest will never be unanimous in choosing to sing in English.

6. In ten years time, British and American varieties will not be the most important varieties of English language.
7. Native English and majority English will become the two predominant types of English.
8. Native English speakers will be advantaged because they will not need to learn a second language.
9. The majority English speakers will be disadvantaged.
10. Native English speakers have already thrown away their phrase books.

Answers: 1T, 2T, 3F, 4F, 5F, 6T, 7T, 8F, 9F and 10F

Thanks for your participation 

Appendix 3 : Application for Permission to Collect Data at UR

Valentin Uwizeyimana

Stellenbosch University

Private Bag X 01

Matieland, 7602

South Africa

E-mail: yuwizeyimana@outlook.com / 16518411@sun.ac.za

Tel: +250 (0) 78 844 3638 / +27 (0) 73 112 5042

Date : March 25th, 2014

To : **The Principal**
University of Rwanda (UR)
College of Education
Kigali - Rwanda

Dear Sir,

Subject: APPLICATION FOR PERMISSION TO COLLECT RESEARCH DATA

I would like to apply for permission to collect the research data from undergraduate students majoring in English language as one of their combination components in the Faculty of Arts and Languages, at University of Rwanda, College of Education at Kigali.


I am a Rwandan student, alumni of former Kigali Institute of Education, doing Masters studies with specialization in **Technology for Language Learning** at Stellenbosch University in South Africa. I am investigating the **Contribution of Mobile Assisted Language Learning to the Acquisition of English as Second Language** (recommendation attached), and I am studying the case of University of Rwanda, College of Education at Kigali. For data collection scheduled to start on June 2nd, 2014, I will administer an evaluation and a questionnaire to students; and within a two-week period, the contact sessions with students, observations and interviews about the use of mobile devices for language learning purposes will be done. The students and any other interested university member will benefit from this research data collection, as it will be an opportunity for them to get exposed to, and to be acquainted with, the use of mobile technologies for ESL input processing.

I look forward to receiving your favorable answer.

Faithfully,


Valentin Uwizeyimana

Appendix 4 : Recommendation for the Research



UNIVERSITEIT•STELLENBOSCH•UNIVERSITY
jou kennisvenoot • your knowledge partner

4 March 2014


Re: Mr Valentin Uwizeyimana (SU student number 16518411)
MA (Technology for Language Learning)

TO WHOM IT MAY CONDERN


Mr Uwizeyimana is currently registered as a Master's student specializing in technology for language learning. I am the supervisor of his research which focuses on the contribution that mobile language input could make in the acquisition of English as a second language specifically in the case of students at the University of Rwanda.

The working title of his thesis is:
The contribution of MALL in the acquisition of ESL at the University of Rwanda. A case study.


Kind regards




Lesley Bergman
Nagraadse Kursuskoördineerder: Tegnologie vir Taalverwerwing
Postgraduate Course Co-ordinator: Technology for Language Learning



Departement Moderne Vreemde Tale • Department of Modern Foreign Languages
Private/Privat Baa XI • Matieland, 7602 • Suid-Afrika/South Africa
Tel +27 21 808 2133 • Faks/Fax: +27 21 808 2035
E-pos/E-mail: itsallee@sun.ac.za • <http://academic.sun.ac.za/forlang>



Appendix 5 : UR Response to the Application for Permission


Administrator - UR College of Education  11 April 2014 at 11:10 AM
To: Valentin Uwizeyimana <vuwizeyimana@outlook.com>
yr request for permission to collect data 1

Your letter dated 25th March 2014 on the above subject refers. On behalf of the Principal, this is to inform you that to be authorized to carry out research in Rwanda requires the Research Permit from MINEDUC-Directorate of Research and Technology. If you have the permit, please send a copy to us. If not, you are advised to seek authorization as per research requirements in Rwanda.

Yours Sincerely,

Niyonshuti Anne-Marie
Administrative Assistant
Principal's Office
Tel: (2532) 2722222222

Appendix 6 : MINEDUC Advice about the Application for Permission

Dr. Marie Christine Gasi...  15 April 2014 at 10:08 AM
To: Valentin Uwizeyimana <van14jolly... and 4 more
Re: Application for research affiliation 2

Dear Valentin,

It is good to hear that you are interested in carrying out research in this very vital domain. It is commendable indeed. However, in my view, there is no one in the Central Ministry who would most suitable to give you the attention and assist you in getting the type of methodology and information you would be needing. It is for this reason that I recommend you to address your request to the UR-CoE (College of Education. With this you will get both professional attention as well as the due attention that this study deserves.

Wishing you success and looking forward to sharing the results of this timely and worthy study,
Sincerely,

MCGasingirwa, PhD
DG STR Ministry of Education
P: 052 785 222 252

Appendix 7 : Application for Research Affiliation at UR

Valentin Uwizeyimana

Stellenbosch University

Private Bag X 01

Matieland, 7602

South Africa

E-mail: vwizeyimana@outlook.com / 16518411@sun.ac.za

Tel: +250 (0) 78 844 3638 / +27 (0) 73 112 5042

Date : April 15th, 2014

To : **The Principal**
University of Rwanda (UR)
College of Education
Kigali - Rwanda

Dear Sir,

Subject: APPLICATION FOR RESEARCH AFFILIATION

With reference to my application for permission to collect the research data of March 25th, 2014,

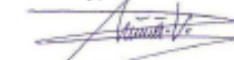
Considering the electronic response, dated April 11th, 2014, to my application,

With respect to the information concerning the process of applying for authority to conduct research in Rwanda, as provided by the Directorate of Science, Technology and Research of the Ministry of Education (MINEDUC) in accordance to the Ministerial Instructions N^o 003/2010 of December 9th, 2010 Regulating Research Activities in Rwanda,

I would like to apply for the research affiliation, from the College of Education of University of Rwanda, for my research project entitled *Contribution of Mobile Assisted Language Learning to the Acquisition of English as Second Language*, the research which is being done for the fulfillment of the Masters' studies which I am currently doing on the sponsorship of the Government of Rwanda.

Your favorable answer is highly appreciated.

Faithfully,



Valentin Uwizeyimana

Appendix 8 : Research Affiliation at UR, College of Education



**UNIVERSITY OF
RWANDA**

COLLEGE OF EDUCATION

OFFICE OF THE PRINCIPAL

16th April 2014

Hon. Minister of Education
P.O.Box 622
Kigali – Rwanda

Honourable Minister,

RE: Recommendation for Mr. Valentin Uwizeyimana to conduct a research study in Rwanda

The above mentioned is a Masters candidate at Stellenbosch University, South Africa. He wishes to conduct his Masters research project entitled '**Contribution of Mobile Assisted Language Learning to the Acquisition of English as a Second Language**' in Rwanda. The research will be conducted at University of Rwanda – College of Education.

Mr. Uwizeyimana has requested for affiliation with the College of Education during the period of his research and we have agreed to support his request on condition that on completion of his research, he will deposit a copy of his thesis with the College. During this period he will be closely followed by Dr. Anthony Kamanzi, Vice Dean – Faculty of Arts and Languages. We therefore request for permission on his behalf to access data sources in his field of survey. Attached, please find a copy of his research proposal and a letter of recommendation from his supervisor.

Any assistance accorded to him will be appreciated.

Yours sincerely,



Prof. George K. Njeroge (PhD)
Principal

CC.

- Director General of Science, Technology & Research
MINEDUC
- Director, School of Postgraduate and Research – College of Education
- Dr. Anthony Kamanzi – College of Education


EMAIL: principal.ce@ur.ac.rw

P.O Box: 5039 Kigali, Rwanda

WEBSITE: www.ur.ac.rw

Appendix 9 : MINEDUC Research Permission Application Form

REPUBLIC OF RWANDA



Ministry of Education
P.O. Box 622, Kigali

Application for Authority to Conduct Research in Rwanda

PART I (*Please read the Rules and Regulations hereby appended*)

1. Applications should be made a minimum of 3 months prior to the proposed start date of the research. All researchers conducting research in Rwanda are required to have an affiliation with a relevant body in the country prior to submitting the application to Directorate General of Science, Technology and Research in the Ministry of Education. Research clearance will be granted for up to 1 year renewable for a further 2 years.
2. The research clearance application forms must be accompanied by the following:
 - i. Comprehensive curriculum vitae of all the applicants
 - ii. A comprehensive project proposal, including details of objectives, hypothesis, methodology, literature review, state the duration of the research (start and end dates) specifying where the research will take place, copies of all questionnaires/informed consent forms/details of expanded methodologies and testing procedures where required and envisaged application of the research results
 - iii. A letter from the sponsor (if any)
 - iv. Two current passport size photographs and a copy of the passport
 - v. Affiliation confirmation letter
 - vi. A recommendation letter from your home university
 - vii. A clearance from Rwanda National Ethics Committee (if necessary)

PART II (*to be completed by the applicant*)

1. Personal Information

a) Surname of project leader.....

b) Other names

c) Passport No.Date of issue.....Expiry Date.....

d) Permanent Residential
Address.....
.....

e) Postal Address
.....
.....;

f) Address while staying in Rwanda.....

g) Telephone contact while staying in Rwanda
.....

h) Age

i) Sex.....

j) Nationality

k) Qualifications

(Please attach above details for other research staff and their curriculum vitae)

2. Personal references:

(Give names and full addresses of two senior academic/professional referees. These should be professionally qualified in the same field of research which the applicants wishes to undertake)

1° Name.....
Address.....
Occupation.....
Contacts: Tel:email:
Date Referee's signature.....

2° Name

Address

Occupation

Contacts: Tel:email:

Date.....	Referee's Signature.....
3. Have you applied for a permit to conduct research in Rwanda before? Yes/No	
Title of the research (if any) previously applied for	
..... Was the application approved/rejected? Give reference	
4. Have you sought affiliation with a Rwandan Institution approved for affiliation purposes?	
Yes/No if yes, please give a name of institution	
..... Contact person's name at affiliating institution	
Person's address at affiliating institution.....	
..... Attach confirmation letter of affiliation.	
If No, you should seek research affiliation with a relevant approved Rwandan Institution and provide names of the Institution (a list of Institutions approved for affiliation is appended). Affiliation is mandatory before a permit can be issued. It is the responsibility of the researcher to look for such affiliation	
5. Name of University/Organization under which the research project is being undertaken	
6. Sources of Finance.....	
Amount.....	

7. Title of the research project
.....
.....
.....

8. Purpose of the research (e.g. MSc., PhD., Post- Doctoral, others (specify))
.....
.....
.....

9. Location of Fieldwork:
Sector.....
District..... Province.....
.....

10. Estimated period of the project:
From.....to.....

11. I will need access to the following public records
.....
.....
.....

12. I will interview the following government Officials
.....
.....
.....

13. I will need to interview members of the public whom I will select as follows:
.....
.....
.....
.....
(Please incorporate details of sampling procedures, if relevant in the description of your project)

14. I intend to use the attached copies of questionnaires (if applicable)

.....
17. Type of collaboration activity
the team will be involved in:
(seminars, lecturers)

.....
18. I certify that I have read and understood the conditions given in parts I and II. I do agree to abide by them as required and that the information given by me in part II is correct to the best of my knowledge.

19. I,(names) do agree that if the research is to be completed outside Rwanda, the raw unfinished material/data must be endorsed by the affiliating institution and the relevant Government office before such materials may be taken out of Rwanda and, I will deposit one bound and soft copy of a final comprehensive report/thesis of my research project with the DSTR and Affiliate Institution on completion of my research project.

Signature Date
.....

PART III (for official use by institution where research is undertaken)

1. Name of the Institution

.....
...
.....
..

2. Recommendation by the Head of the Institution

3. Name

.....

4.

Position.....

5. Official Stamp and Signature

.....

Date.....

PART IV *(for official use only)*

1. Comments by DSTR Research Committee

.....
.....
.....
.....

DateChairman of the Committee.....

2. Recommendations by Research Committee

.....
.....
.....
.....

3. Approved/Not approved/ Recommended for Ethics Committee Approval

DateChairman, DSTR Research Committee.....

(Please appended herewith find proposed Affiliate Institutions)

Appendix 10 : Informed Consent Form



UNIVERSITEIT•STELLENBOSCH•UNIVERSITY
jou kennisvennoot • your knowledge partner

STELLENBOSCH UNIVERSITY CONSENT TO PARTICIPATE IN RESEARCH

Contribution of MALL to the acquisition of ESL: Case of University of Rwanda

You are asked to participate in a research study conducted by *Valentin Uwizeyimana* from the *Department of Modern Foreign Languages* at Stellenbosch University, the research of which results will be contributed to research paper, thesis or dissertation. You were selected as a possible participant in this study because you are studying English as the main subject of your undergraduate studies at University of Rwanda, College of Education.

1. PURPOSE OF THE STUDY

The purpose of this message is to determine the extent to which the use of mobile devices can contribute to the acquisition of English as a second language (ESL) in Rwanda.

2. PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things within the period not exceeding four weeks:

- ✓ To attend the introductory meeting and workshops about the use of mobile devices for language learning purposes.
- ✓ To use your mobile device(s) for ESL learning purposes for a period of at least two weeks according to the guidelines and recommendations provided by the researcher.
- ✓ Sit for an evaluation and respond to the research questionnaire at the end of the research data collection period.

3. POTENTIAL RISKS AND DISCOMFORTS

This study is a no-risk research. No sensitive information will be requested, no laboratory experiments will be carried, and no physical or psychological tests will be administered. With its interference and conflict free status, it will only concern the normal ESL learning process at University of Rwanda.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

In addition to contributing to one's academic knowledge in applied linguistics, especially in technology for language learning and in second language acquisition, this study has the following benefits:

- ✓ The research subjects and any other interested member of University of Rwanda will get free training, guidance and assistance on the use of mobile devices for learning purposes.
- ✓ The subjects will get exposed to more ESL input which can contribute to their English proficiency and the success in their studies.

5. PAYMENT FOR PARTICIPATION

This is not a money-oriented research. It is the academic research that was not funded by any institution as a business-oriented project. No subject/participant will receive payment for participating in it.

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. In addition to the thesis, the results of our analysis will be used within other formats such as teachings, conferences, journal articles and book chapters, but we will spare no effort to keep your identity confidential by using letters, numbers, and pseudonyms instead of actual names. No one will ever be able to identify you from anything you say.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact Mr. Valentin Uwizeyimana, Principal Investigator [E-mail: yuwizeyimana@outlook.com or telephone: +250 (0) 78 844 3638 / +27 (0) 73 112 5042]. Also, feel free to contact Ms. Elizabeth K. Bergman, Supervisor [E-mail: lb2@sun.ac.za or telephone: +27 (0) 21 808 2514].

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [E-mail: mfouche@sun.ac.za or telephone: +27 (0) 21 808 4622] at the Division for Research Development.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to me by *Mr. Valentin Uwizeyimana* in [*Kinyarwanda/English/French/other*] and I am in command of this language. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of Subject/Participant

Signature of Subject/Participant

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ [*name of the subject/participant*]. [*He/she*] was encouraged and given ample time to ask me any questions. This conversation was conducted in [*Kinyarwanda/English/French/other*] and no translator was used.

Signature of Investigator

Date

Appendix 11 : The MINEDUC Research Project Approval N° 2128/12.00/2014

REPUBLIC OF RWANDA



MINISTRY OF EDUCATION
P.O.BOX 622 KIGALI

Mr. Valentin Uwizeyimana
Masters Student
Stellenbosch, South Africa
Tel: +250788443638
Email: vu_wizeyimana@outlook.com
16518411@sun.ac.za

Kigali, 27/10/2014
N° 2128/12.00/2014

RE: Approval to conduct research in Rwanda under the project title: "Contribution of Mobile Assisted Language Learning to the Acquisition of English as a Second Language: The Case of University of Rwanda"


I am pleased to attach a copy of research clearance, which has been granted to you to conduct research on the above title.

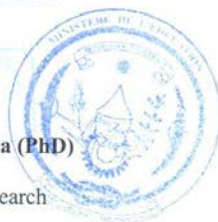
I wish to remind you that the research permit number should be cited in your final research report; the research should be carried out under affiliation of the University of Rwanda, under supervision of Dr. Anthony Kamanzi, Vice Dean of Faculty of Arts and languages, UR-College of Education

A copy of the final research report is to be given to the Ministry of Education of Rwanda.

I wish you success in your research.

Yours sincerely,


Marie-Christine Gasingirwa (PhD)
Director General,
Science, Technology and Research
Ministry of Education



Cc.

- Minister of Education
- Minister of State in Charge of Primary and Secondary Education
- Minister of State in Charge of TVET
- Permanent Secretary, Ministry of Education
- Dr. Anthony Kamanzi, Vice Dean of Faculty of Arts and languages, UR-College of Education

**Appendix 12 : The MINEDUC Letter N° 2129/12.00/2014
Granting the Permit N° MINEDUC/S&T/256/2014**

REPUBLIC OF RWANDA

Kigali, 27.10.2014
N° 2129/12.00/2014



MINISTRY OF EDUCATION
P.O.BOX 622 KIGALI

Re: Permission to carry out research in Rwanda - No: MINEDUC/S&T/256/2014

The Permission is hereby granted to **Mr. Valentin Uwizeyimana**, MSc student in Technology of Language Learning, Stellenbosch University, South Africa, to carry out research on: **“Contribution of Mobile Assisted Language Learning to the Acquisition of English as a Second Language: The Case of University of Rwanda”**.

The research will be carried out in the University of Rwanda-College of Education. The researcher will interview the sample of students doing English as one of the major subjects at the University of Rwanda, College of Education.

The period of research is **from 29th July, 2014 to 28th July, 2015**. It may be renewed if necessary, in which case a new permission will be sought by the researcher.

Please allow the **above mentioned researcher**, any help and support he might require to conduct this research

Yours sincerely



Marie-Christine GASINGIRWA (PhD)
Director General,
Science, Technology and Research
Ministry of Education